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NON-OPERATIVE TREATMENT IN GYNECOLOGY

NON-OPERATIVE TREATMENT IN GYNECOLOGY

BY

GEORGE GELLHORN, M.D., F.A.C.S.

PROFESSOR OF GYNECOLOGY AND OBSTETRICS AND DIRECTOR OF THE DEPARTMENT, ST. LOUIS UNIVERSITY SCHOOL OF MEDICINE; GYNECOLOGIST AND OBSTETRICIAN, ST. LUKE'S HOSPITAL, ST. JOHN'S HOSPITAL AND CITY HOSPITAL; GYNECOLOGIST, BARNARD FREE SKIN AND CANCER HOSPITAL; MEDICAL DIRECTOR, MUNICIPAL PRE-NATAL CLINICS, ETC.

GYNECOLOGICAL AND OBSTETRICAL MONOGRAPHS

WITH 176 ILLUSTRATIONS

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TO

MY WIFE

PREFACE

GYNECOLOGY has long been considered a strictly surgical specialty, and the brilliant successes achieved will for all time to come give proof of the perfection of technical skill and scientific ingenuity. Surgery, however, has its limitations in the treatment of gynecologic diseases. New fields have been opened wherein surgery takes little or no part. I need merely mention the vast domain of disturbances of the endocrine system. New methods such as radiotherapy and protein therapy have been devised which rival or excel the results of operative treatment. Then there is the problem of purely functional disorders without any organic pathology, and the realization has slowly gained ground that certain gynecologic complaints are not due to lesions of the genital organs but have their roots in some other organ, or else are caused by purely psychic factors; that in such cases, therefore, we would by surgery be attacking symptoms only without getting at the causes.

Thus it was that a new trend began to make its appearance in gynecologic therapy—a tendency to substitute non-surgical for surgical procedures wherever they would better serve the interests of the patient. What was formerly —and rather contemptuously—called "minor gynecology," has now become an important movement which claims a part in the treatment of almost every gynecologic ailment. So rapid has been the stride of this new development in the last decade that it is drawing the *exclusively* surgical era in gynecology to a close.

It is the purpose of this book to take stock, as it were, of what has thus far been accomplished and to present to the practitioner, in a concise form, a compilation of modern non-operative methods which he may employ in the treatment of his gynecologic patients. In selecting from the enormous number of suggestions made and procedures recommended, I have been guided primarily by personal experience with the methods in question; where such personal experience was lacking, the views of trustworthy observers have been given due deference.

All treatment, in order to be rational, must be based upon an acquaintance with the pathology of the condition to be treated, a search into the cause or causes, a familiarity with the signs and symptoms, and the mastery of the diagnostic means by which all this knowledge may be acquired in any given case.

In accordance with this reasoning I have attempted to supply the necessary foundation in the first part of this volume. In each of the subjects discussed, the etiology, pathology, and diagnosis are dealt with rather briefly whereas the appropriate non-operative treatment is presented in broad detail so that the reader will have no difficulty in carrying out any of the procedures recom-

mended. The choice of the subjects naturally depended on, and was limited by, the well-defined scope of the book.

The accentuation of non-operative treatment does not mean that it is necessarily all-sufficient in every case; and so, wherever surgical and non-surgical methods are in competition, the relative advantages of one or the other method are clearly stated lest the patient suffer from an unduly prolonged conservatism.

The second part of the book consists of a detailed description of gynecologic technic. A number of methods and procedures have here been grouped together so as to avoid disturbing repetitions in the text.

I am indebted to Dr. Henry Schmitz, of Chicago, for contributing, from his rich experience, the chapter on radiation treatment in gynecology. I have given credit at the end of each chapter to my sources of information, and in particular, I have freely consulted the works of Berkeley and Bonney, Fairbairn, Findley, von Jaschke and Pankow, Menge and Opitz, and Kelly. I wish to thank Mrs. H. McClure Young for many of the drawings, and Mr. George F. Cucchi for his assistance in preparing the prescriptions. Finally, it gives me pleasure to acknowledge the courtesy and consideration of the publishers.

GEORGE GELLHORN

ST. LOUIS.

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INTRODUCTION

CHAPTER I

THE GYNECOLOGIC HISTORY

A gynecologic diagnosis is the product of three equally important factors: the history given by the patient, the findings on examination; and the knowledge and experience of the observer.

Many hospitals provide printed record forms for history taking, but these are not desirable for the practitioner as they make a mechanical performance of what should constitute an intelligent and individualizing approach to the problem presented by the patient. The best procedure is to ascertain by a question or two what has brought the patient to the physician and, having made reasonably sure that the case is a gynecologic one, to proceed with the questioning in logical sequence.

After the *date* and the *name* of the patient is noted, her *address* is put down. This is not merely a matter of business, but may point to the possible influence of the environment upon the general health of the patient. (Malarial districts, tenement part of the city, high altitude, etc.)

The Age.—In conjunction with other information to be elicited and the findings obtained later, the matter of age may be of great significance. A hemorrhage at the age of fifty-five, for example, presents an entirely different aspect from one at twenty.

Occupation.—There are occupational diseases in women as well as in men, and this question may have a direct bearing upon the final shaping of the diagnosis and the outlining of the treatment.

Is the patient *single* or *married;* if the latter, *how long?* It may save mutual embarrassment to ascertain this point before proceeding to the next question:

How Many Confinements Has She Had?—It is necessary to know the number and the ages of the children because, for example, of the untoward effect of too many pregnancies in quick succession both upon the general health and the pelvic structures.

Were these confinements *spontaneous* or *instrumental?* A *rapid convalescence* may be interpreted as an afebrile puerperium; a *protracted recovery* is suggestive of some form of puerperal infection, the late results of which may contribute to the patient's present complaint. A thorough investigation into the history of former gestations is all the more justified in view of the fact that more than fifty per cent of all gynecologic patients date their respective ailments back to some previous confinement or miscarriage.

How Many Children Are Alive and Well?—A history of stillbirth or fetal death in the first few weeks is suggestive of syphilis.

Have There Been Any Miscarriages?—If so, how many, and at what period of gestation? It is necessary to determine whether these miscarriages occurred spontaneously (which would point either to syphilis or to a marked uterine disease) or were induced, but this question may be inserted later when a full understanding between patient and physician is established.

The *menstrual history* is next in order. At what age did the *first* menstruation occur? Menstruation in the temperate zone begins, as a rule, around the age of fourteen; when it is delayed to the seventeenth year or even later, the possibility of infantilism must be kept in mind.

Frequency and *duration* of the menses afford valuable information. A simple formula is useful; for example, $\frac{4-5}{28}$, meaning that the menstruation occurs every 28 days and lasts from four to five days. Is the menstrual flow *scanty, moderate,* or *excessive?* The answers to this question are not very exact because a sensitive or apprehensive patient may consider excessive what a more indifferent woman would designate as moderate. The number of napkins used may serve as an indication of some sort. Is the flow bright red or *clotted?* Is there any *pain* before, during, or after the period. If so, of what character and where located? The significance of this symptom will be considered in many of the following chapters, particularly in the discussion of dysmenorrhea. Finally, and never to be omitted, the *date of the last menstruation* must be obtained, to which should be added the length of interval after the last previous menstruation. Absence of menstruation in a heretofore regularly menstruating woman at once suggests the possibility of pregnancy. Again an unusually long interval between the last two menstruations may turn our thoughts towards the eventuality of abortion or extra-uterine pregnancy.

In women who have passed into the climacterium, the preceding questions regarding the menstrual life are dispensed with and only the time of menopause is noted.

The *previous health* of the patient is now inquired into. General conditions, acute or chronic infectious diseases, operations, accidents, all may have an important bearing upon the question to be decided.

Then follows the history of the *present illness.* Now is the time to let the patient tell her story in her own way. It will establish closer relations between her and the physician. It may take a little more time, but she is entitled to it, since she may have nerved herself up to this consultation for a long while and rehearsed her "case" in her mind many a time. While she speaks, the physician jots down what seems to him essential, and only if the flow of words is too voluminous or the account too incoherent does he by pertinent questions determine the time of onset of the present trouble, the probable causes, and the sequence of the subjective symptoms. By underscoring the principal complaints the physician can, on later occasions, recall at a glance what first brought the patient to him.

The three cardinal symptoms of gynecologic diseases are pain, hemorrhage, and discharge which occur either singly or in various combinations. They may seem rather monotonous to the beginner, but contain valuable hints to the experienced observer. As regards pain, its location, severity, char-

acter, and incidence should be described; likewise its dependence upon exertion, posture, menstruation, etc. As to hemorrhages, those that are merely anomalies of menstruation (menorrhagias) must be distinguished from irregular bleeding in the intermenstrual period (metrorrhagias), and attention must be paid to duration, intensity, free intervals, gross appearance of the flow, accompanying pain and other by-effects, influence upon the general condition, and the like. If there exists a discharge, we want to know about its quantity and quality. Is it white, yellow, or greenish, clear or tinged with blood? Is there an offensive odor, and does it irritate the external parts? When was it first noticeable and has it any relation to the approaching or past menstruation?

To the story of the present illness are now added certain questions regarding the *present condition* in so far as they have not yet been touched upon. Such questions refer to appetite, bowel action, and any gastro-intestinal symptoms; to urination and any disturbances thereof (the history of burning on micturition soon after marriage, for instance, would be suggestive of a gonorrheal infection); to restful or disturbed sleep; to loss or gain in body weight; to headaches and general nervousness.

Finally, it is of interest to know whether the patient has already been examined or treated elsewhere for her present illness.

This, for the moment, concludes the taking of the history. Additions may have to be made to it later after the patient has been examined. The delicate inquiries into the sexual life, for instance, may well be postponed until the physician is sure of the confidence of the patient. If we become suspicious of tuberculosis, the family history will have to be investigated.

In no case is the history sufficient to make a diagnosis without an examination (with the possible exception of adolescent girls in whom the mere account of the symptoms, notably hemorrhages, might justify an attempt at treatment without previous examination). Neither should the information elicited on questioning ever bias the judgment of the examiner, but should serve largely to concentrate his attention on certain points to be determined, or to aid him when he is in doubt as to how to interpret his findings.

It may seem that the taking of the history is a time-consuming procedure, and, as a matter of fact, young hospital interns struggle for hours until they have elicited the desired information. But with growing experience the task becomes more simple, and ten to fifteen minutes suffice, as a rule, for this first step in our diagnosis.

CHAPTER II

THE GYNECOLOGIC EXAMINATION

Even while writing the history the physician begins with his examination. First impressions are of great importance, and just as the physician by his tactful, sympathetic, and earnest attitude may at once win the lasting confidence of the patient, so the patient will frequently by reciting her history reveal to the observer valuable information regarding her personality. It is not so much what she says, but how she says it that counts. Her behavior, the very multitude of complaints, obvious exaggerations of symptoms, an inordinate anxiety concerning her health and the frequency with which she may have consulted one physician after another, all these features indicate to the careful observer—and every physician should be a good psychologist —whether he has to deal with a person of stable nerve equilibrium or with one of neuropathic traits. Having obtained the latter impression, he should, however, not fall into the common error of ascribing every symptom to "imagination." That word had better be eliminated altogether from the vocabulary of the practitioner. Where there is smoke, there is fire. Only the frankly insane—which includes the genuinely hysterical—will wholly fabricate their symptoms, and these belong to the psychiatrist rather than the gynecologist. In all others there is an exciting cause though possibly trivial and not necessarily connected with the genital system, and it must be our object to ferret out this underlying factor and to reduce it to its proper proportions. I shall have to refer to this subject in later chapters. Suffice it to repeat here that the taking of the history affords the practitioner a chance to gauge, in a general way, the personality of his patient.

In addition, while taking the history, he has an opportunity to note the general appearance of the patient, her build, her state of nutrition, complexion, and gross evidence of plethora or anemia. He will also record other obvious anomalies such as goiter, exophthalmos, uneven pupils, tremor, etc.

The patient is now ready for physical examination. For the protection of the physician as well as for the sake of the patient's feelings, *this examination should never be made except in the presence of a third person,* preferably an attendant, or, if desired, an accompanying relative or friend.

Let us bear in mind that the object of our examination is to search for the cause of the patient's complaints. This need not necessarily be located in the reproductive organs proper; hence the first examination must include at least a cursory investigation of the entire body. Such a mode of procedure will do much towards altering the harsh criticisms of modern overspecialization and modify the satirical definition which that grand old man, Abraham Jacobi, once gave to me of the gynecologist as "a man who looks at the world through a vaginal speculum."

Unless there is a special indication, I leave this general survey to the end of my gynecologic examination and concentrate my attention for the moment upon the abdomen.

For this purpose the patient has to remove her corset and loosen her skirt bands. The chemise is pulled up or a union suit is slipped down from her shoulders, for even the thinnest kind of underwear would interfere with the examination.

The patient is now placed upon an examining table or chair. Of the multitude of models advertised, one should be chosen which permits the easy raising of the lower end; for, as will be seen later, there are a number of diagnostic and therapeutic procedures which require a sort of Trendelenburg position.

If the physician is called to the patient's home, he will have to get along as best he can. An ordinary abdominal or bimanual examination can be made in bed fairly well, but for an instrumental examination or treatment, the patient must lie in bed crosswise with the buttocks at the edge and the feet resting on chairs. Better still is a kitchen table which is covered with blankets and a sheet, and if neighbors or relatives can be found to hold the legs, a very good makeshift can be obtained, provided, of course, the patient is not too ill to be moved. The personality of the patient, the external surroundings, helpers, the nature of the case, the condition and the sensitiveness of the patient, all these influence the physician's procedures. With a little common sense the practitioner will find his way in any situation, but at best an examination at home is only a substitute. It is easy in most cases to make the public understand that what is most convenient for the doctor is also better for the patient, and to arrange for another examination in the office.

ABDOMINAL EXAMINATION

With the patient lying on her back, the abdomen is bared from the ribs to the pubes; a sheet thrown over the legs and knees satisfies the natural demands of modesty.

Inspection.—A glance will reveal whether the abdomen is flat, caved in, or, on the contrary, prominent. If the latter, what is the form or shape of the distention and in which region of the abdomen is it located? (Fig. 1.) Does the abdomen appear firm or flabby? Are there any visible movements (fetal motions, peristaltic waves, pulsations, etc.)? Striae suggest a previous gestation; pigmentation of the linea alba, a present pregnancy. A masculine type of pubic hair (Fig. 2) points to the need of search for endocrine anomalies. Scars denote operations. A more or less generalized skin eruption creates suspicion of syphilis and calls for further clinical investigation. Edema and varicose veins are the expression of circulatory disturbances, general or local, the nature of which is yet to be determined.

Palpation.—If palpation is to be satisfactory, the patient must not be in a strained position. Her head must be on a pillow and the upper end of

the table should be raised a trifle; her feet are on foot rests, not in uncomfortable stirrups and leg holders. The hands of the examiner must be warm and dry, and, for palpating, the *whole* volar surface of the hands should be

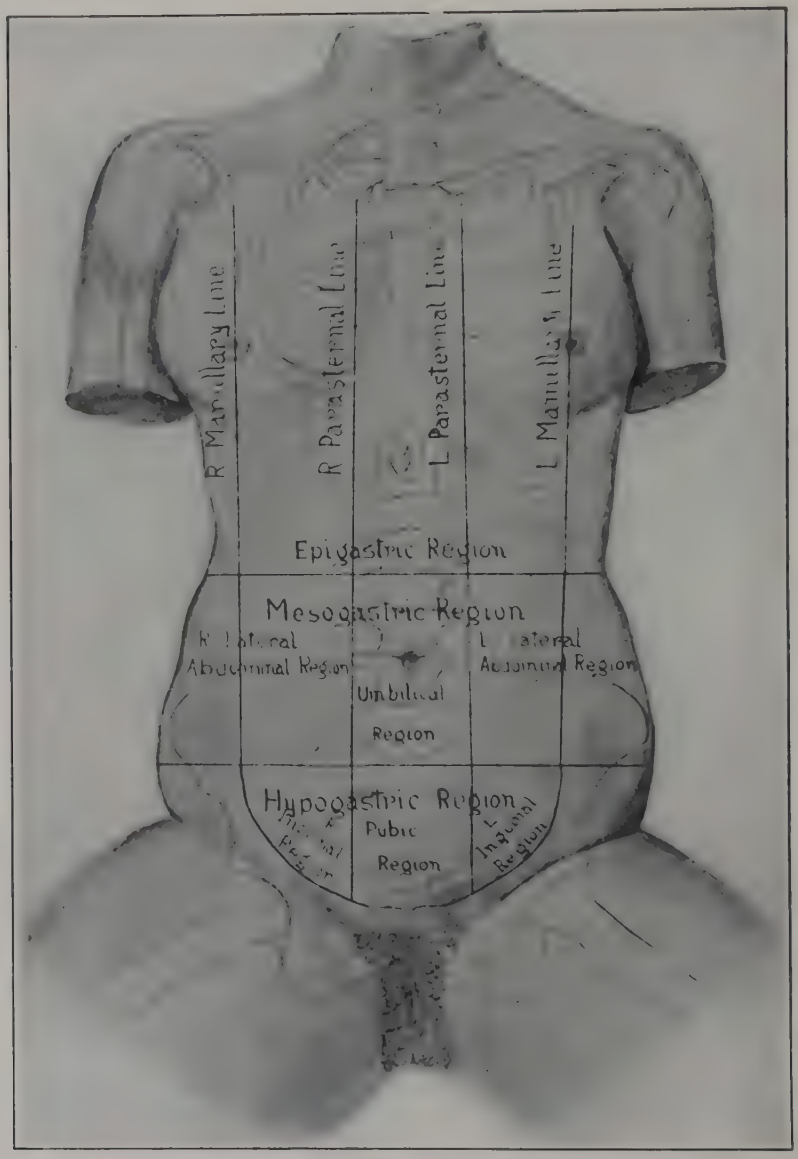


FIG. 1.—REGIONS OF THE ABDOMEN (adapted from Sellheim).

used. The common mistake of palpating with fingertips only defeats its purpose. The procedure hurts and the patient contracts her abdominal muscles involuntarily. By using the whole hands many more sensory nerve endings are utilized, and, if all pressure is avoided, the finest differences in consistence become perceptible and even normal organs, for example, the

stomach, can be outlined. A very soft pregnant uterus will often elude the mere finger touch, but reveal its contours to the gentle "laying on of hands."

Without changing their position, the hands follow each respiratory move-

FIG. 2.—PSEUDOHERMAPHRODISM (from Blair Bell, *The Sex Complex*, Macmillan). Note the masculine distribution of hair on pubes and thighs.

ment and, with a very slight circulatory motion, bear downward, thus gradually overcoming the resistance that any nervous and apprehensive patient is likely to offer at the first examination. If at the same time the patient's attention is diverted by conversation, much valuable information can be obtained without her knowledge.

If these suggestions appear too elementary, I would say that daily observations of hospital interns or postgraduate students, many of whom had been

in active practice for years, have convinced me of their timeliness. I realize, of course, that the refinement of palpation, the education of the sense of touch, cannot be taught in books, but a word of guidance may be of value.

Abdominal palpation should be carried out in a systematic manner. *Never begin to palpate in the region where the patient localizes her pain.* Thus, if the pain is complained of in the left lower quadrant, I start in the left upper quadrant and proceed to the right and then downward until I finally reach the sensitive area. The same systematic proceeding is advisable where no special abdominal pain is mentioned. In this manner a survey of the conditions in the abdomen is obtained. For gynecologic purposes, the findings in the right lower quadrant are of particular importance because of the frequent and intimate relations between appendix and right adnexa. The excessive frequency of appendectomies which afterward proved to have been unnecessary is a sad commentary to the hastiness with which tenderness on palpation in the right lower quadrant is interpreted as an appendical lesion. At the risk of transgressing beyond the scope of this book, but at the same time for the purpose of a proper differentiation between appendicitis and adnexal diseases, I must insist that the diagnosis of the former requires at least a history suggestive of intestinal involvement, the presence of "muscular defense," and of the positive outcome of Meltzer's and Bastedo's signs. Further, rule out the possibility of stone in the right ureter, make certain that the same tenderness does not exist in the left side, and, above all else, satisfy yourself that *the pain does not merely reside in the skin.* This hypersensitiveness of the skin, which can quickly be demonstrated by gently pinching a fold of the epidermis, is suggestive of neurasthenia or hysteria and, therefore, extremely valuable in our final estimation of the case. In the left lower quadrant the condition of the sigmoid arrests our notice and plays its part in the making of the gynecologic diagnosis.

Greatest attention, of course, is given to the central portion of the lower abdomen. Here we note particularly the thickness, consistence, tension, and tenderness of the abdominal walls. The inexperienced are apt to mistake the promontory which is readily felt between the separated recti (diastasis) in thin persons, for a tumor. As to real tumors, their relation to the abdominal walls, their size, shape, contour, consistence, mobility, and tenderness are investigated. Adherent intestines are diagnosed from the sensation of escaping air and the changes in size and shape during palpation. Crepitation suggests peritoneal changes.

Percussion.—This supplements palpation if the latter causes too much pain or the tumor is too soft to be felt distinctly. It is of importance for the diagnosis of ascites.

Auscultation.—This is required largely in the differentiation of pregnancy,

PELVIC EXAMINATION

No internal examination should be made without a previous inspection, lest most valuable information be lost. As a rule, only the woman who has something to hide will object to it. If the patient be draped decently, there can be no question of immodest exposure. Be sure to have sufficient natural or artificial light for this part of the examination.

Inspection.

A. The patient lying on her back, the feet in foot rests, the knees separated as widely as possible, one observes:
   1. The mons veneris; quantity of adipose tissue, amount of hair, parasites.
   2. Genitocrural folds; discoloration, intertrigo, varicosities, hernias.
   3. Major lips; size, thickness, adipose tissue, hair, unilateral enlargement, edema, ulcers, varicosities, condylomata, etc.
   4. Vulval cleft; closed in the nulliparous, gaping in case of torn or relaxed perineum; presence and appearance of any discharge.
   5. Perineum; length, injuries, scars.
   6. Anus; prolapse, skin tabs, hemorrhoidal nodes, condylomata, etc.

B. After the major lips are separated with thumb and index finger:
   1. Clitoris; size.
   2. Inner surface of major lips; color, discharge, fissures, ulcers, etc.
   3. Minor lips; length, width, pigmentation (masturbation).

C. After both the major and minor lips are separated:
   1. Urethral opening and Skene's ducts; inflammatory signs, urethral caruncles, pus.
   2. Hymen; shape of intact hymen, tears, myrtiform caruncles, etc.
   3. Bartholin's glands; flea bite redness ("macula gonorrhoica"), inflammation, enlargement.
   4. Fossa navicularis and fourchet; scars, discharge, ulcers.
   5. Protrusion of anterior and posterior vaginal walls in women with wide vulva; these become more marked when the patient strains as if at stool.

Inspection is followed by internal examination.

Internal Examination.—For every internal examination or manipulation about the genitals, the hand of the examiner should be protected by clean finger cots or rubber glove. It is untrue that the sense of touch is thereby blunted. On the other hand, one will avoid contamination from one patient to another and will protect himself against a syphilitic infection.

A thorough internal examination requires a certain preparation of the abdomen. Bladder and rectum should be empty. Such favorable premises usually do not obtain at the first examination, but, on the other hand, this has its advantages because we have a chance to examine the patient under her ordinary conditions of life. A rectum filled with hard fecal matter may occasionally give us an explanation of the patient's complaint and suggest the

proper treatment. Pus may be discovered about the urethral opening if the patient has not voided for some time past.

It is my custom to catheterize every new patient at her first visit unless there is a distinct contra-indication. The urine thus obtained is free from any contamination with vaginal secretion and can be used for chemical and microscopic examination. The method of using a catheter is extremely simple, and yet it is constantly sinned against both by nurses and physicians. Metal catheters should never be used. Their surface quickly becomes rough and "sandpapers" the urethra, as some one has very aptly described it. Soft rubber catheters become too soft from frequent boiling and cannot be handled as aseptically as glass catheters. These are the best kind in spite of the disrepute into which they have fallen from occasional accidents due to breaking. It is the old story of the man behind the gun. If the catheter, just before introduction, is held against the light, any crack can be discovered. If there is none, no trouble need be feared. Following are the rules for proper catheterization:

1. Have all the implements ready and handy before beginning.

2. Boil a glass catheter with a short piece of rubber tubing slipped over the end.

3. Have a basin at hand with a ½ per cent lysol solution or a bichloride of mercury solution 1:1000, containing a few pieces of sterile cotton.

4. Have a basin ready for the soiled cotton, and a urine glass.

5. Separate the labia with the gloved thumb and index finger of the left hand and expose the urinary meatus. *Do not change the position of your fingers until the catheter is in the bladder.*

6. Sponge the urinary meatus freely with the cotton pledgets from the antiseptic solution. *Do not squeeze out the pledgets.* It is not the cotton you want, but the solution. You cannot possibly disinfect the delicate mucosa, no matter how hard you may rub it, but by the rubbing you will hurt the patient and abrade the tender tissues. All you can expect to do is to wash off a certain number of bacteria around the urethral opening and weaken those that remain.

7. Hold the end of the catheter delicately between thumb and index finger of the right hand, about the way you hold a pencil, and introduce the tip into the urethra. *Be sure that the catheter touches nothing on the way from the sterilizer to the meatus, not even the mucosa outside the meatus.* If you happen to touch the vulva, even one half inch from the meatus, boil the catheter again and repeat the procedure. The catheter may be lubricated with some sterilized oily substance, such as sweet oil or glycerin (not vaselin!), but it usually is unnecessary.

8. Now push the catheter gently through the urethra and follow, with a slight upward motion, the curve of the under surface of the symphysis. Never should the catheter "be grasped firmly with the fist, as though the nurse were determined to overcome any obstacles encountered by main force; neither must it be pushed straight in, as though the urethra were a straight tube." (Kelly.)

Done in this manner, catheterization is both painless and harmless and

should precede the first examination. At the following visits, unless there are special reasons, the patient voids before mounting the examining table, for it is clear that a filled bladder would lie between the uterus and the abdominal wall, and no one can possibly palpate with any degree of satisfaction through what in effect corresponds to a warm water bag.

We now proceed with our examination.

The labia are spread apart with thumb and index finger of one hand and the fingers of the other hand introduced into the vagina. I prefer to examine with two fingers, unless, of course, a narrow vaginal entrance will admit but one finger. It would be best to train both hands for purposes of examination, but, as a matter of fact, very few men are truly ambidextrous. The middle finger is introduced first and, by pressing the yielding perineum downward, opens the vaginal entrance wide enough to let the index finger slip easily inward. In doing so, pressure on the sensitive urethral opening against the pubic arch must be avoided. The fingers must be well lubricated with liquid soap, glycerin or any of the jellies on the market.[1] *Vaselin should never be used;* it ruins the gloves and, being deposited in the vagina, it renders the proper appreciation of any vaginal discharge impossible.

The first part of the internal examination is the *digital examination* which informs us regarding the following points:

1. Vaginal entrance; tenderness, width, condition of the perineum.

2. Vagina; tender, narrow, wide, condition of surface (normal, smooth, rough), folds, redundancies, constricting bands, excrescences, pulsations, consistence, temperature, indurations, scars, etc.

3. Cervix; position (normally, the cervix is on a line between the spines of the ischium (Fig. 3); the tip "points" into the hollow of the sacrum, almost at right angle with the vagina; under pathologic conditions the cervix may be either "high" or "low," "pointing" forward or laterally); size, shape, consistence, mobility, configuration of external os, lacerations, scars, etc.

4. Vaginal vaults (anterior, posterior, lateral), depth, protrusions, differences in size of lateral fornices, scars, etc.

5. Bony pelvis; normally roomy or with obvious protuberances.

Bimanual Examination.—The outer hand is now placed upon the abdomen above the symphysis for the bimanual or combined examination. As in abdominal palpation, the entire hand, not merely the finger points, should be used. The beginner invariably holds both hands too rigid as if he were about to undertake a task requiring muscular effort. He must learn to

[1] A very satisfactory, *sterile,* and colorless lubricating jelly which the practitioner can prepare himself at very small cost contains the following ingredients:

Menthol	0.3	(gr. 5)
Powdered tragacanth	14.0	(℥3½)
Glycerin	225.0	(℥7½)
Water	225.0	(℥7½)

In a *dry* glass or enamel container mix the entire amount of tragacanth thoroughly with about half the glycerin until the mixture is free from larger particles. Then add the rest of the glycerin and, lastly, the water, keeping the mixture well stirred all the while. Now boil the mixture to proper consistence. When nearly cooled after sterilization, add the menthol dissolved in 10 c.c. of alcohol. The entire mixture is now put into *six* collapsible tubes which have previously been sterilized by boiling.

relax his arm if he wants to feel the inner parts well. *The elbow of the inner hand is lowered;* the fingers then glide inward easily and "carry the perineum into the pelvis" (Crossen), and the oft-heard complaint that the fingers are too short no longer obtains. The fingers within the vagina merely steady and somewhat elevate the uterus—the index finger in the anterior fornix, the middle finger at the cervix. The outer hand bears downward, gently but steadily, sometimes with a light circulatory motion, until the outer and inner

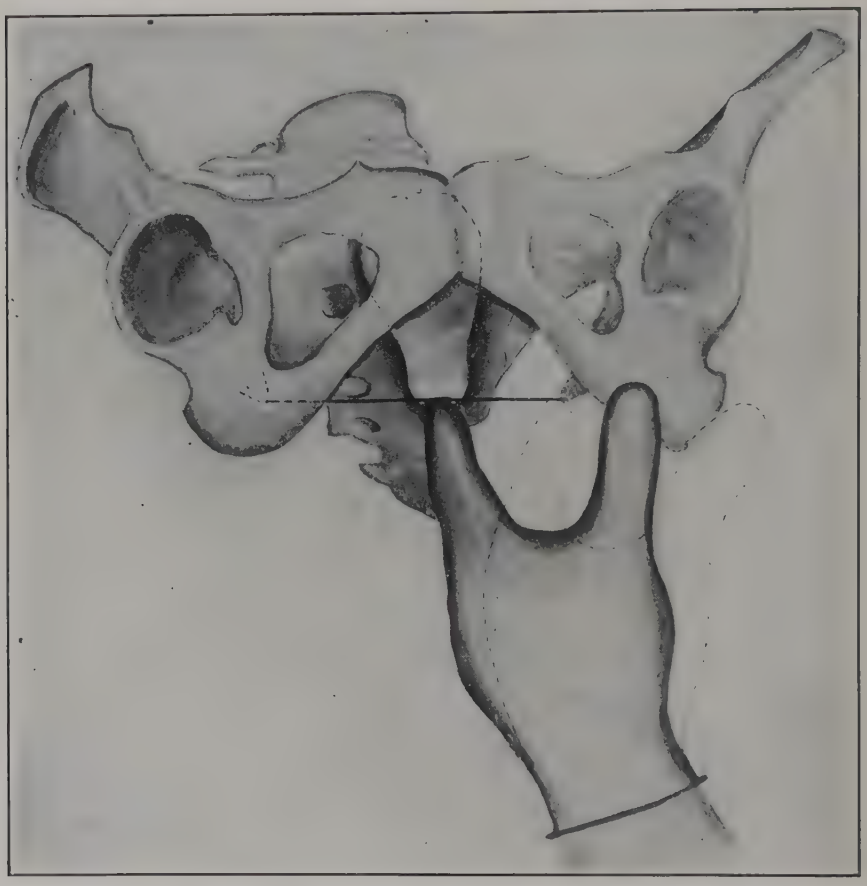


FIG. 3.—RELATION OF THE CERVIX TO THE INTERSPINOUS LINE. The spines of the ischium can well be felt by digital touch (after Sellheim).

fingers are separated only by the uterus which can now be palpated in its entirety. For the palpation of the adnexa, the two hands move into the corresponding side. A nervous patient resists involuntarily because she fears pain; even a less apprehensive woman will hold her breath at first. More or less complete relaxation of the abdominal muscles is essential. This is accomplished not by using greater force or by getting impatient, but by making the patient talk, if possible, on subjects not connected with the business on hand. Sometimes the Trendelenburg position is an excellent help. I frequently have the patient raise her hips off the table and remain in this uncomfortable

position for a few minutes. The strain and fatigue of the muscles is usually followed by complete relaxation which suffices for the examination. Kelling has his patients drink water during the examination and finds that this relaxes the abdominal muscles. Hirsch introduces a large rectal tube or a thick uterine dilator into the rectum and requests the patient firmly to contract the sphincter; the result is a reflex relaxation of the abdominal musculature. If all efforts fail, it is much better to desist, prescribe a sedative and repeat the examination after a day or two. The second examination is often surprisingly easy. In the majority of cases, however, we obtain sufficient information the first time.

The points to be considered are:

1. Uterus: position, relation to cervix and body (relative size and angle between these), size, consistence, surface (smooth, irregular), mobility, sensitiveness, etc.

2. Tubes and ovaries: normal tubes cannot be felt, as a rule; normal ovaries have the size of an almond in the shell and slip between the fingers. The left ovary is normally a little lower and closer to the uterus, the right ovary is closer to the pelvic wall; a mature graafian follicle or a fresh corpus luteum temporarily increase the size. Determine, in general, size, form, surface, consistence, mobility.

3. Parametria: soft, thick, rigid, uneven, cicatricial.

4. Tumefactions: site of origin, size, form, surface, consistence, mobility.

Rectal Examination.—In order to introduce the well lubricated index finger painlessly into the rectum the patient strains as if at stool, whereupon the sphincter ani relaxes (see page 180). In virginal patients, recto-abdominal palpation takes the place of the bimanual examination. In women with torn hymen, it supplements the combined examination; the introduction of the thumb into the vagina renders the examination more satisfactory; or the middle finger may be introduced into the rectum, the index finger into the vagina (Fig. 4). By examination through the rectum the length, thickness, tension, and tenderness of the sacro-uterine ligaments can be determined much better than through the vagina. The posterior surface of the retroflexed uterus, ovaries lying in the culdesac, and pelvic tumors are likewise more accessible to the touch. It is highly desirable to practice, and gain efficiency in, this rather neglected method of examination.

Speculum Examination.—In all patients, except those with intact hymen, an inspection through a speculum is indispensable. For ordinary purposes, a bivalve speculum, of which two sizes should be on hand, is sufficient (Fig. 5). The closed instrument is well lubricated and introduced as described above; the labia are separated, the perineum depressed, and the speculum pushed gently inward. The blades are then spread apart and by cautious manipulation, the cervix is made visible. The following points deserve attention:

1. Cervix: size, eversion of anterior and posterior lip, shape, color, condition of surface (nabothian follicles), tumors, etc.

2. External os: shape, size, immediate vicinity (erosions, scars, ulcers),

secretion (quality, quantity), abnormal protrusions (polyps, membranes, placental tissue), etc.

FIG. 4.—RECTO-VAGINAL EXAMINATION. The sacro-uterine li[illegible] [illegible]re p[illegible]icularly well palpated by this method (after von Jaschke [illegible]ankow).

3. A drop of secretion taken with a platinum loop from the external os, the cervical canal, or wherever desired, and smeared on a glass slide for microscopic examination.

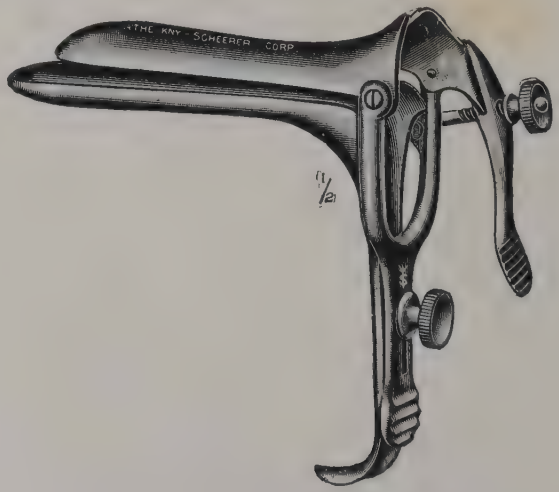


FIG. 5.—BIVALVE SPECULUM (Kny-Scheerer).

While withdrawing the speculum, attention is paid to the appearance of the vagina, namely, color, swelling, abnormal folds (congenital malformations), excrescences, secretion, bleeding, recent traumatisms, pressure marks

(pessaries), ulcers, scars, etc. That instruments and hands must be clean should be understood, if the examination is to be without danger. Metal instruments, in particular, should be sterilized by boiling both before and after use.

Special Examinations.—The value of the *uterine sound* (Fig. 6) is greatly overrated by the rank and file of the profession. It enables us to measure accurately the depth of the uterine cavity (normally 7½ cm. = 2½ inches), to determine its direction, and to obtain an impression of its width. These advantages are insignificant compared with the information derived from a thorough bimanual examination, and they are more than outweighed by the dangers of infection, perforation, hemorrhage, or the stirring up of a quiescent pelvic inflammation. It is only in a suspected stenosis of the internal orifice that we cannot very well do without the uterine sound, though we must be aware that difficulties in passing the instrument may arise, not only from strictures, but also from folds of the mucosa or a very acute angle between cervix and body. To replace the retroflexed uterus by means of the sound, a procedure formerly much in vogue, is reprehensible. To expect to feel with the sound a polyp, a cancer, the inflamed endometrium or retained products of gestation is a fallacy inherited from past [illegible]tions.

The techni[illegible] of sou[illegible] requires most careful precaution. The cervix is e[illegible]posed in the speculum and thoroughly cleansed with lysol, bichlorid of mercury, or alcohol sponges; the cervical canal, if wide enough, is wiped out with a thin cotton applicator dipped in tincture of iodin. The anterior lip is caught and steadied with a volsella on which gentle, steady traction is made. The freshly boiled sound is held loosely between thumb and index finger and introduced into the external os under guidance of the eye, special care being taken not to touch the vaginal wall or cervix on the way. The passage into the uterus must take place *without using any force.* In anteflexion of the uterus the handle of the sound is lowered, in retroflexion it is raised.

On the whole, the practitioner should learn to restrict the use of the sound to a minimum by perfecting himself in the ordinary methods of examination.

FIG. 6.—UTERINE SOUND (Kny-Scheerer).

As an aid to diagnosis, *the uterine curet* finds its place chiefly in cases where there is suspicion of malignancy. The technic of curettage is described fully in the second part of the book. The propriety of scraping the uterus to clinch the diagnosis of cancer has recently been challenged by several writers who contend that the neoplasm, thus traumatized by the curet, is stimulated to more rapid growth and that metastases may take place before the pathologic report is returned. This argument, which seems well founded, has much in

its favor, and where the diagnosis of carcinoma of the uterine body is well established, it is, indeed, superfluous and harmful to delay definite action by an exploratory curettage. On the other hand, the neglect of this diagnostic aid on principle may lead to unnecessary or needlessly radical surgery. I confess to having changed my attitude since I found in two uteri, which I extirpated because of assumed malignancy, only small pedunculated submucous fibroids which could have been removed without sacrificing the uterus.

The importance of the chemical and microscopic examination of the urine, the inspection of the urinary meatus, and the palpation of the urethra as diagnostic aids in gynecology will be discussed in a separate chapter. Here only the ocular examination of the interior of the bladder by means of *cystoscopy* may be mentioned. Of the various methods of cystoscopy, the artificial illumination of the water-filled bladder seem to me to offer the greatest advantages, and of the instruments on the market, the Brown-Buerger cystoscope, made in this country, is eminently satisfactory. Familiarity with the cystoscope is indispensable to the gynecologic specialist. The general practitioner will be less apt to perfect himself in the use of this instrument though the technic is, on the whole, not difficult to acquire. Special courses are offered nowadays in many of the medical centers, and the curriculum in most of the medical schools contains instruction in this procedure. Additional information may be obtained from the study of works on genito-urinary surgery and in most gynecologic textbooks. The therapeutic aspect of cystoscopy, however, should be reserved for the specialist.

Of other special methods of examination, dilatation of the uterus and proctoscopy will be discussed elsewhere in this book. It is true that the general practitioner, to whom I am addressing myself, will not always be in a position to employ all of these more special means of diagnosis and, if in doubt, he will call a competent gynecologist to his aid.

LITERATURE

Berkeley and Bonney. Guide to Gynaecology, London, 1919.
Crossen. Diseases of Women, 5th ed., 1922, C. V. Mosby Co.
Eden and Lockyer. Gynaecology, 2d ed., New York, 1920.
Findley. Diseases of Women, Lea and Febiger, 1913.
Hirsch. München. med. Wchnschr., 1921, No. 36, 68.
Kelling. München. med. Wchnschr., 1921, No. 49.
Kelly. Medical Gynecology, 1909.
Sellheim. Die geburtsh.-gynaekol. Untersuchung, 1910.

PART I

DIAGNOSIS AND TREATMENT

CHAPTER III

DISTURBANCES OF DEVELOPMENT

Congenital malformations of the female genital organs are beyond the scope of this book, because they are either not amenable to any form of treatment or, if capable of correction, require more or less complicated operations which must be left to the specialist. There are, however, two conditions belonging to this chapter which are of importance to the practitioner, namely, Hermaphrodism and Constitutional Anomalies.

HERMAPHRODISM

The sex of an individual is determined solely by the sex glands. The appearance of the external genitals or the development of the secondary sex characteristics, that is to say, of all those features which give to the body a specifically feminine or masculine stamp, are irrelevant as far as the determination of sex is concerned.

We call a person who possesses both male and female sex glands a hermaphrodite. Such a *true hermaphrodism* is extremely rare; there are about a dozen authentic instances of this sort in the literature of the world.

We speak of *pseudohermaphrodism* if a person has sex glands or gonads of one sex (testicles or ovaries) and external genitals that belong to, or more or less resemble, those of the other sex. Pseudohermaphrodism is not a common malformation, yet it is not so rare as to be without practical significance to the practitioner. Neugebauer, in 1905, collected 980 cases from the literature, including 43 observations of his own, and quite a few new instances have come to light since then.

Pseudohermaphrodism occurs in two principal forms:

1. Feminine pseudohermaphrodism; this class of cases possesses ovaries, while the external genitals are more of a masculine type. This form is rare.

2. Masculine pseudohermaphrodism; the great majority of all hermaphrodites belong to this group. Their sex glands are testicles, their external genitals resemble more or less closely those of the female. The secondary sexual characteristics may be essentially female, as seen in the distribution of hair, the large size and functional activity of the mammary glands, treble voice, feminine type of pelvis, slight ossification of the thyroid cartilages, etc., and there may be homosexuality (desire for the male) and female mentality in general. On the other hand, there may be an endless variety of the anatomical as well as the physiologic and psychologic features present to complicate the clinical picture. Such individuals are usually brought up as

girls, not infrequently enter matrimony, and pass throughout their lives as women, unless development of male sex characteristics, such as external habitus, beard, voice, or sex instinct, eventually create doubt as to their proper sex classification.

Space does not permit more than the citation of a few cases. Neugebauer found no less than 68 marriages entered into by hermaphrodites with persons of the same sex; in all of these, the "wife" was in reality a male hermaphrodite; in four, the autopsy of the deceased "husband" revealed his female sex. A remarkable case was that of Karl Menniken who was married, as a man, from his twenty-seventh year to his fifty-seventh year. At postmortem the cause of death was found to be carcinoma of the uterus. During the laryngoscopic examination of a supposed woman, the startling discovery was made that the vocal cords were those of a man, and the conclusion that such was her real sex was confirmed later.

The tragic life of such individuals when once they become aware of their anomaly can readily be imagined, and Neugebauer described four instances of attempted suicide, of which three terminated fatally.

There is, then, sufficient reason for the practitioner to bear this abnormality in mind despite its comparative rarity. His first opportunity will come at the birth of the child when the inspection of the genitals, which only too often is rather perfunctory, may reveal some deviation from the normal. Careful investigation, perhaps in consultation with an experienced specialist, should be made at this time lest the sex of the newborn be wrongly entered. At any rate, a record should be made and kept for future reference. If the question as to sex cannot be settled with certainty, Lawson Tait advised leaving the classification undecided, educating the child tentatively as a girl. A masculine pseudohermaphrodite brought up as a girl will adapt himself to a change in his sex status more readily than a female hermaphrodite reared as a boy. Ballantyne, on the other hand, considers it wisest in such doubtful cases to regard and to register the child as a boy; for not only are the cases of male pseudohermaphrodism ten times as numerous as those of female pseudohermaphrodism, but there is the additional reason that the social risks of bringing up a girl among boys are not so great as those of bringing up a boy among girls.

Pseudohermaphrodism may come to the practitioner's attention at the age of puberty when, for example, a mother consults him because the daughter has not yet menstruated. There has been, in the past, a traditional over-regard for the modesty of the young girl, and the family physician has been only too apt to make a guess at chlorosis, prescribe iron, advise a general hygienic régime, and the like. The omission of a thorough examination is a serious mistake and may jeopardize the reputation of the practitioner as a diagnostician and helper in trouble. Indeed, the absence of menstruation, the lack of mammary development, the appearance of the secondary sex characteristics of the male, or physiologic phenomena, such as pollutions, or psychologic tendencies, such as homosexual desires, directly point to the necessity of an examination, preferably under anesthesia. In Steglehner's case (quoted by Neugebauer) the mother demanded that a postmortem be made on the

daughter who had died of pulmonary tuberculosis to determine why the girl had never menstruated. Autopsy revealed the presence of testicles.

Again, if girls consult the practitioner before contemplated marriage, or when married women complain of sterility, difficulty or pain in cohabitation, excessive or deficient sexuality, or perverted desires and practices, the physician may be able to discover cases of pseudohermaphrodism.

The question of treatment of pseudohermaphrodites in mature life will hardly concern the practitioner. That problem must be left with the specialist in gynecology, and general rules cannot be propounded. The practitioner's principal duties will be the timely detection of the anomaly at birth or puberty so as to prevent troubles which may arise later.

CONSTITUTIONAL ANOMALIES

What is "constitution"? Webster's Dictionary defines constitution as the aggregate of the physical and vital powers of an individual. For the purpose of a medical discussion we have to go into more detail. To begin with, constitution is something inborn, something the individual brings with him into the world. It may not become apparent until later in life but it is present all the time as an essentially immutable quality which gives a distinct color or tone to all the processes of life of this particular individual.

What we call the normal development of the body is that harmonious growth of all physical and mental faculties of the organism which makes for good health and which we expect to find in the majority of human beings, that is to say, in at least 51 per cent of all cases. Normal persons respond to outer or inner stimuli of known quality in a certain well defined way, and while physiologically there is considerable latitude, yet this response exhibits no pronounced differences. To illustrate my point with a somewhat extreme example, a railroad wreck may shake up a normal person considerably, but when the soreness from any bruises which he may have suffered has subsided, the accident passes off without any further effect and becomes a thing of the past. We may call this reaction his physical character, his *constitution*. In another person, however, we may see this same accident become a starting point of prolonged invalidism, and from this profound difference in reacting to the same stimulus we conclude that in the second case we have to deal with an abnormal constitution.

As a second instance let us take the case of two girls who had been in an equally delicate state of health until they were married. Both become pregnant and each gives birth to a child; but while the one blossoms out into a woman of splendid physique and is able to fulfill in every way her duties as a mother, a wife, and a homemaker, the other emerges from her physiologic task as from a dreadful ordeal which leaves her physically and psychically exhausted. In the first individual an originally normal constitution which was affected only temporarily asserted itself in overcoming the extra demands made on the organism; in the second, the general constitution,

inherently weak from the beginning, found it impossible to cope with the situation.

In medicine, the rôle constitution plays in the manifestations of disease was long ignored. A hundred years ago physicians used to take the factor of constitution into consideration—"temperament" it was called then—but during the greater part of the nineteenth century, morphological and structural changes in the various organs monopolized the attention of the observers to such a degree that local diagnosis and local therapy became of paramount importance.

Applying this trend of thought at once to our special field, the fact was too often lost sight of that frequently the task of the gynecologist could not be limited to the local treatment of the deranged genital system, that not only the diseased womb but also the sick woman needed attention. To be sure, there are affections which begin and end as purely localized lesions, a cervical polyp, for instance, or a pedicle-twisted ovarian cyst; but in many other cases, the local disorder within the genital apparatus affects the entire organism. I mention only the uterine fibroid with its effect upon the heart and the quality of the blood. In still other cases, diseases of other remote organs may give rise to prominent symptoms within the genital sphere; a good example is tuberculosis of the tubes and uterus which almost always is secondary to a tuberculosis of the lungs.

Such observations and experiences led, in the course of time, to a more careful consideration of the entire organism when sick women came for the relief of gynecologic ailments. A more thorough study of the sick woman, as an entity, gradually brought about a recognition of striking differences of behavior under similar circumstances and of marked variations in reaction to identical stimuli. Thus it was that in the most recent past a very intensive appreciation of the constitutional factor, as defined in the beginning of this chapter, was introduced into the consideration of the general organism of gynecologic patients.

It soon became apparent that in such women anomalies of constitution existed to an undreamed-of extent, and that there were various types or categories of abnormal constitution which in well defined cases presented certain characteristic features. As far as the present state of our knowledge permits, we can distinguish three types which are frequently associated and in general bear a very close interrelationship. These are (1) infantilism; (2) asthenia; (3) endocrine disorders.

1. **Infantilism.**—The female organism begins to emerge from the undifferentiated state of childhood between the eighth and tenth years and, passing through the stages of adolescence and puberty, reaches sexual maturity between the sixteenth and eighteenth years. This normal development may be arrested during childhood for a shorter or longer or even an indefinite period of time. If the entire organism is affected and the individual retains physically and mentally the characteristics of childhood, we speak of a *universal infantilism*. More often only certain organs have failed to develop properly (*partial infantilism*); among these, the genital system is more particularly affected (*genital infantilism*).

The cause of this arrest of development is obscure in most cases. In others we can elicit factors which may impair the vitality of the germ cells, such as syphilis, tuberculosis, alcoholism, insanity, or epilepsy of the progenitors, or general racial degeneration due to inbreeding. Harmful influences may act as a drag upon the growing organism; for instance, premature birth, malnutrition in the early years of life, diseases in childhood, such as rickets, or in puberty, such as chlorosis; although, in regard to the latter, it has been claimed by internists that chlorosis is not the cause, but the result of infantilism. An unhygienic mode of life (factory work of children) or mental overwork of schoolgirls may have its share. Finally, a disturbance in the realm of the glands with internal secretion might well be an important factor.

The very much greater frequency of infantilism in women has been explained by the assumption that woman, standing halfway, as it were, be-

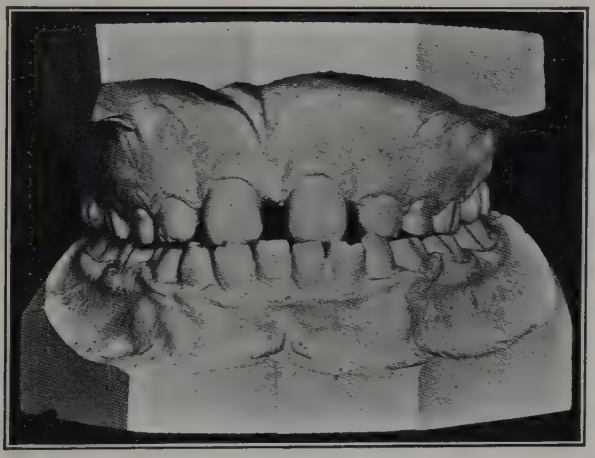


FIG. 7.—AN ABNORMALLY WIDE SPACE BETWEEN THE UPPER MEDIAN INCISORS IS CALLED "TREMA." A similar gap between the upper lateral incisor and canine is called "diastema." Other anomalies of the teeth in infantilism are persistence of milk teeth, microdontia, defects of enamel, etc. (courtesy of Dr. B. E. Lischer).

tween child and man both as to her physical habitus and her psychic life, possesses a sort of "physiologic infantilism."

In very marked cases of universal infantilism, the body is slender, either short, as that of a child, or, on the contrary, excessively tall if the ovaries have been insufficient during puberty and the pituitary body has attained a vicarious ascendency (page 33). Between these extremes all sorts of transitional stages may occur. The face is small; the lower jaw is poorly developed; the teeth show a number of anomalies (Fig. 7); the hard palate is either very shallow or abnormally deep. The thorax is stenosed above and wide below, with an obtuse epigastric angle so that the ribs run almost horizontally. The pelvis is often generally contracted and somewhat funnel-shaped. The long bones are delicate, the thighs are slim, and knock-knees and flat-feet are common. The breasts are poorly developed and the nipples

small and frequently inverted. The buttocks are flat and often almost pendulous (Figs. 8 and 9).

The alterations of the inner organs comprise a very small heart, thin blood-vessels, a stenosed aorta, a vertical stomach, an elongated appendix with wide base, movable cecum and abnormally long sigmoid, a cylindrical bladder often associated with a partially patent urachus, and lobulation of the kidney.

In the genital sphere we find the following signs of infantilism:

The pubic hair is often very scant; again it may be perfectly normal. Not infrequently the type is more masculine, that is, the pubic hair extends

FIG. 8.—INFANTILISM IN A GIRL OF TWENTY-ONE YEARS WHO HAS NEVER MENSTRUATED (courtesy of Dr. William Engelbach).

tonguelike towards the umbilicus and continues along the linea alba; more or less copious growth of hair may be found around the anus.

Vulva: Major and minor lips are thin and poorly developed; the clitoris is relatively large.

Perineum: This is usually rather low and often without a well marked fourchet.

Vagina: The vagina is narrow, the anterior wall often markedly shortened; the fornices are distinctly more shallow than normal.

Uterus: The entire organ is diminished in size (Fig. 10). In the normal uterus the proportion between body and cervix is as 2 to 1 (Fig. 11). In the infantile uterus the proportion is reversed. Its largest part is the cervix, which is long, conical, and hard to the touch. The external os at the pointed end of the cervix is usually very small (pinhole os). The uterine body is extremely small, an appendix only to the cervix, and is either acutely anteflexed or retroflexed. The isthmus between cervix and body is often palpable

as a flattened, ribbonlike, connecting link. The long cervix points in the axis of the vagina because the tense anterior vaginal wall pulls it forward and because the congenitally shortened sacro-uterine ligaments pull the upper portion of the cervix backwards. The casual observer easily diagnoses a

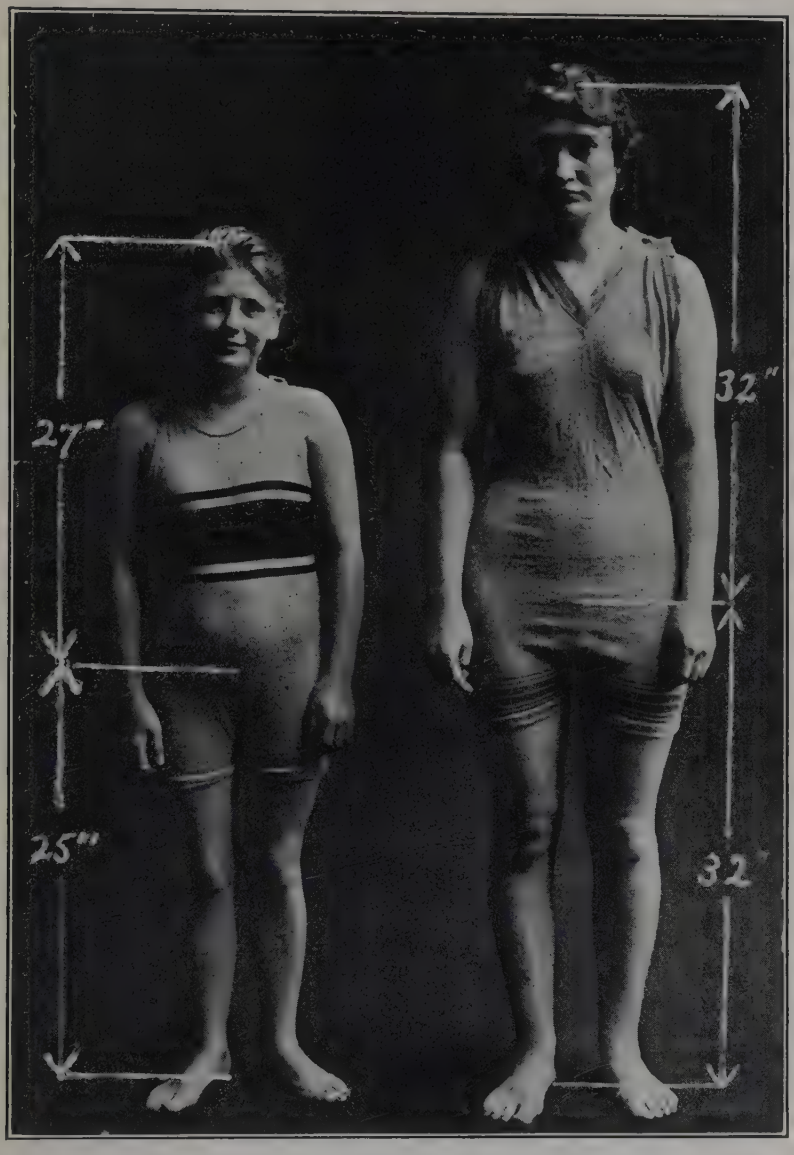


FIG. 9.—THIS GIRL IS NINETEEN YEARS OLD AND HAS NEVER MENSTRUATED. Compare her size with that of a normal adult (courtesy of Dr. William Engelbach).

retroversion. On more careful examination, however, particularly through the rectum, only the cervix is found leaning backward while the knoblike body is acutely anteflexed.

Adnexa: Tubes and ovaries are, as a rule, too small and located too

high to be felt on bimanual examination. The former exhibit corkscrewlike convolutions. The latter are small, white, hard bodies with thickened tunica albuginea; on microscopic examination they contain many follicles which have undergone imperfect maturation and have become atretic.

FIG. 10.—INFANTILE UTERUS. Note the proportion between cervix and body.

Pelvic peritoneum: Both the anterior and the posterior culdesac are abnormally deep.

Cases in which all these "stigmata" are combined are extremely rare. A person of this kind (Fig. 12) has the mentality of a child or is even close to imbecility. The patients that we, as gynecologists, so very frequently come in contact with, exhibit but few of the more obvious signs. Often the outer appearance seems to differ in no wise from that of perfectly normal women and only the genitals present more or less pronounced, yet unmistakable, indications of infantilism. Careful scrutiny will then disclose infantilistic signs in other parts of the body.

The more prominent gynecologic symptoms of such patients include amenorrhea, scant and infrequent menses, dysmenorrhea, habitual abortion

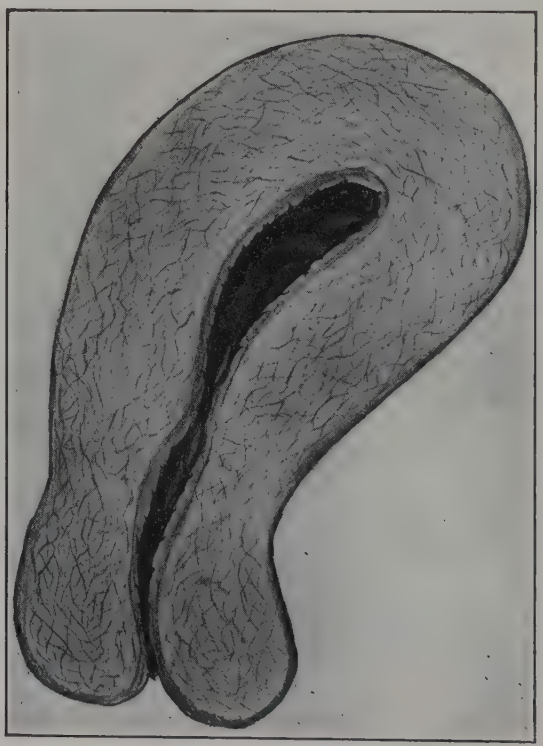


FIG. 11.—NORMAL UTERUS. The proportion of the body to the cervix is as two to one, exactly the reverse of that shown in the preceding picture.

in the earlier weeks of gestation, "one child sterility" or complete barrenness, lactation atrophy of the uterus, and premature menopause.

More will be said about these symptoms and their treatment in later chapters. It will suffice here to have called attention to the frequency of this constitutional anomaly which cannot fail to modify the course of many gynecologic diseases. As far as the practitioner is concerned, familiarity with the signs and symptoms of infantilism will impress him with the necessity of treating not only the local lesion, but the entire sick woman.

FIG. 12.—A PRONOUNCED CASE OF GENERAL INFANTILISM (from Stratz).

2. **Asthenia.**—Much that has been said of infantilism applies to another frequently encountered anomaly of constitution to which Stiller has given the name *asthenia universalis congenita;* in fact, features of both anomalies are often found in one and the same individual. Yet there are several significant differences between the two conditions.

DEFINITION.—Asthenia may be defined as an insufficiency of the vital energy of the entire organism which becomes particularly manifest if the cerebrospinal and vegetative nervous systems are likewise affected.

ETIOLOGY.—This *hypotonic constitution,* as it has also been called (Tandler, is congenital, inherited, and its primary cause is unknown. Untoward factors in postnatal life, such as malnutrition, have no etiologic influence, for we find asthenic individuals in well-to-do families where the greatest care has been exercised in the upbringing of the children. Neither are acute infectious diseases in childhood the cause; they merely show the lack of resistance in asthenic children.

SIGNS.—The congenitally asthenic girl or woman is usually below medium height, slender, and underweight. The skin is pale and thin, as though wilted. The face is long and narrow with large eyes and a tired, melancholic, often anxious expression. The swanlike neck rises from sloping shoulders. The clavicles are prominent. The thorax is long and flat, the epigastric angle is acute and the course of the ribs is markedly oblique. The ninth and tenth ribs are more often "floating" than in normal persons. The abdominal muscles, like all other muscles, are thin and weak. The abdomen protrudes. Whereas, in normal women the largest circumference is just below the um-

bilicus, it is here considerably lower (Fig. 13). Even in young girls there is a faint indication of a "frog belly"; more so in older patients. The distance between costal arch and pelvic crest is diminished, which intensifies the sagging of the abdomen. The pelvis lacks the normal declination and frequently presents generally reduced measurements. The extremities are long, the arches low, though flat-foot occurs not so regularly as in pure infantilism. In erect posture, the neck points forward, the results of a moderate cervicodorsal kyphosis; the normal lordosis, on the other hand, is either absent or abnormally low. Taken all in all, these patients often look younger than their actual age.

FIG. 13.—GENERAL ASTHENIA. Note the round shoulders and the protruding abdomen (from Stratz).

All abdominal viscera, including the kidneys, are low. In consequence, there is an impairment of circulation and the resulting venous congestion may give rise to hemorrhoids, varicosities of the legs, and a bluish discoloration of the external genitals.

In the genital sphere, the hypotonic condition of muscles and fasciae manifests itself in a thin and weak pelvic floor. The uterus is rather soft and abnormally movable. The flabbiness of all supports and ligaments permits wide excursions in the position of the uterus; we may find the uterus in anteflexion to-day and in retroflexion to-morrow. Now and then a complete prolapse is observed in young girls or nulliparous women. I once encountered a case of this kind in a girl of thirteen in whom the procidentia had been of five years' standing. The ovaries frequently prolapse into the culdesac. Labia majora and mons veneris lack their natural bolster of fat.

SYMPTOMS.—This general lack of tone which has been sketched in the foregoing, readily explains the variegated symptomatology of the condition; these patients are ill equipped congenitally to stand the wear and tear of life. The mere business of living puts them to a task to which they are not equal. A slight extra demand finds them unable to cope with the situation—as if a low-powered automobile were made to climb a steep hill. No wonder then that such individuals are always exhausted, always too tired to fulfill their duties or to enjoy life.

The inborn weakness of the muscular apparatus is regularly accompanied by tiredness and lack of resiliency on the part of the nervous system. This state of neurasthenia or neuropsychasthenia is sometimes more marked than the muscular asthenia. Its chief expressions are hyperesthesia and psychic depression. Hyperesthesia manifests itself in an excessive intensity of painful sensations. A slight headache, for example, that is merely a transient annoyance to a normal person, is to a neurasthenic a calamity which causes complete prostration. The psychic depression evidences itself in the egocentric attitude of the patient. Not interested in her surroundings, she con-

centrates her attention upon conditions of her own body. She is either reticent and hypochondriacal or, on the contrary, she is untiring in enumerating and exaggerating her symptoms. She is subject to rapidly changing moods, now resigned and submissive, now irritable and intolerant. Vague fears are never absent, and the apprehensiveness of becoming insane has more than once driven the despairing patient to suicide.

The enteroptosis of congenital asthenia produces symptoms typical of acquired downward dislocation of abdominal organs, particularly backache and sensations of pulling and bearing down. The coincidence, however, of enteroptosis and neurasthenia enormously intensifies these symptoms and gives rise to others which we fail to find in the acquired enteroptosis of normal women.

Other prominent symptoms of asthenia, such as nervous dyspepsia and mucous colitis, will merely be mentioned.

The gynecologic symptoms comprise pain in the abdomen and back, dysmenorrhea, menorrhagias and metrorrhagias, discharge, constipation and discomfort in sexual intercourse—in other words, the same symptoms that we meet in all possible affections of the female genitalia. The salient point of difference between an asthenic and a normal woman is the discrepancy between cause and effect, the obvious disproportion between the symptoms complained of by the patient and the objective findings elicited on examination.

Where such a discrepancy exists, the practitioner must be on guard lest he overlook the underlying constitutional cause and treat only an unessential symptom—a course which is bound to do harm to the patient and to his own reputation.

Not that symptoms of constitutional anomalies should not be treated at all, but from what has been said both of infantilism and asthenia, it must be evident that attention to these abnormal and inferior constitutions must be our first and foremost object, in so far as an anomaly of constitution is at all capable of correction.

3. **Disturbances of the Endocrine Glands.**—The growth of the body and the full development of many of its functions is governed to a large extent, if not altogether, by the endocrines or glands with internal secretion. These glands are organs which do not secrete their products through a duct, but give off their secretions directly into the circulating blood. The substances produced are called hormones. Their chemical nature is unknown with the sole exception of the secretion of the adrenals. We merely know that they contain no albumin and are different from all external secretions which are ferments or enzymes and destroyed by heat.

In the widest sense of the term, practically all the organs of the body produce chemical substances which are absorbed directly into the blood. Strictly speaking, however, the quality of internal secretion is confined to the thyroid and parathyroid, the thymus, adrenals, hypophysis, epiphysis, and the gonads or sex glands (ovaries and testicles).

It is the latter which claim our attention in a book on gynecology. If the ovaries produce less hormones than normal, we speak of hypofunction;

an excessive production is called hyperfunction, and a qualitatively disturbed, though perhaps quantitatively normal, production is termed dysfunction. The same terminology applies, of course, to the other endocrines as well, and in this connection, it is well to bear in mind that the conditions are not always so simple as appears from this classification and that for some cases we must assume that the three features exist side by side in one and the same disease.

Physiologically the normal development of the genital tract depends upon the undisturbed internal secretion of the ovary, and the same is true of the functions of the genital tract, namely, puberty, menstruation, pregnancy, and climacterium. Which part, or parts, of the ovary in particular are the chief source of this specific secretion need not detain us here.

Any functional disorder of the ovaries must needs evidence itself in a pathologic behavior of puberty, menstruation, and climacteric. To be a little more definite, hypofunction of the ovaries finds its expression in hypoplasia of the genitals, scanty or delayed menses, amenorrhea, and sterility—features which have already attracted our attention in certain other disturbances of general development, such as infantilism and congenital asthenia. Hyperfunction of the ovaries manifests itself in many of the cases of uterine bleeding. To this group belong the hemorrhages at puberty and the climacterium, the latter only in so far as they are not caused by neoplasms; further, the precocious menstruation and the uterine hemorrhages accompanying ovarian tumors. The bleeding associated with infection of the adnexa has, in all likelihood, nothing to do with the inflammation of the uterus itself but is caused, in its last analysis, by a pathologic hyperfunction of the ovaries, and even in the hemorrhages of fibroids, features of ovarian hyperfunction are not altogether missing. A marked dysfunction of the ovary, alone or combined with either hypofunction or hyperfunction, is discernible in chlorosis and in many cases of dysmenorrhea.

In the voluminous works of Aschner, Barker, Bell, Biedl, Falta, Novak, and others, a bewildering multitude of experimental studies and clinical observations has been collected which must impress the critical reader with the fact that we are only at the threshold of this new field of medicine, that from our present, not far advanced post of observation we can see but few things clearly, while most of the phenomena can only dimly be perceived, and that many of our current conceptions are subject to momentary changes.

Even with the most conservative evaluation of endocrinologic problems, we cannot evade the conviction that the great majority of inner secretory disturbances are inherited or congenital, and a very simple process of reasoning will then lead us to the conclusion that the endocrine system forms a part of our constitution. Disturbances of the endocrine system, therefore, represent constitutional anomalies and as such their discussion belongs rightly in this chapter on disturbances of development.

This will become still clearer if we remember that one of the most important characteristics of hormones is the fact that they influence each other to a very marked degree. We may picture the situation to ourselves, too crudely perhaps, yet sufficiently to obtain a working hypothesis, if we imagine

that the machinery of the female organism is controlled in the main by the four most important endocrine glands, the thyroid, adrenals, hypophysis, and ovaries. These four glands divide themselves into two groups, the thyroid [1] and ovaries on one side, the adrenals and hypophysis on the other, and each group associates to itself some of the lesser endocrine glands which, however, we will leave out of consideration for the sake of simplicity. The glands belonging to the same group work in harmony—we call them synergistic—and each group is antagonistic to the other. By this very antagonism they exert a mutual restraint in such a way as to maintain a balance of power, to borrow a popular political phrase, and as long as this exists and there is no predominance of one group or one member of one group, the individual is in good health and able to fulfill her functions normally, provided, of course, there is no anatomical lesion in any important organ of the body.

This very delicate equilibrium is easily disturbed. We see that under quite normal conditions. The sex glands enter the endocrine circle comparatively late and withdraw again from the combination after the age of reproduction. These two events of puberty and menopause bring about a well marked upset in the finely poised equilibrium of the endocrine system and produce fluctuations which, while originally physiologic, often border on, or actually merge into, the pathologic. Only thus can we understand why in many girls the thyroid enlarges in adolescence or why the change of life produces a host of annoying symptoms. We can also understand why in pregnancy where there is a temporary physiologic hypofunction of the ovaries, the hypophysis occasionally attains a transitory ascendancy which evidences itself in the so-called gestation acromegalia and in certain forms of edema; or why the adrenals, released for the moment from the restraining influence of the ovaries, produce pigmentations such as chloasma uterinum.

To be sure, the disturbed balance normally rights itself after a shorter or longer period of oscillation. If, however, the ovaries habitually secrete an insufficient amount of hormones, a more permanent disorder in the endocrine system is apt to occur. Either the associate of the ovary, the thyroid, undergoes a compensatory hypertrophy in an effort to maintain the threatened equipoise by a hyperfunction of its own, and eventually develops into a separate and well defined disease (exophthalmic goiter), or one of the antagonists, for instance the hypophysis, becomes predominant and gives rise to either gigantism or acromegalia.

This antagonism, particularly between ovaries and pituitary body, may be recognized also in the opposite direction; that is to say, the sooner the sex glands come into full activity, the more the hypophysis, whose chief function pertains to the growth of the long bones, is restrained in its energy. This, in all probability, is the reason why southern races, who, sexually, mature very early, are smaller than the northern races and why women on an average are shorter than men.

The assumption of a governing board of the "Big Four" offers a simple

[1] Some authors differ as to whether it is the thyroid or parathyroids that are associated with the ovaries.

enough interpretation of many of the baffling phenomena before us and serves to explain that disturbances of secretion in one endocrine gland immediately produce disturbances in the other endocrine glands so that it is often difficult to determine in which gland the disturbance originated.

Unfortunately, in many cases, the situation is much more complicated from the very beginning. There are, for instance, the cases of hypothyroidism, in its severe forms known as myxedema. The patients are unusually short and rather thick-set, more or less adipose girls and women. The skin is dry, thick, and cool; the face, neck, and extremities are often swollen. The hands look plump and short, the eyelids hang down, and the upper lid is thick and protruding. The behavior is apathetic and indolent, the speech slow and expressionless. Sweat secretion ceases entirely. Disturbances of ovarian secretion are always present, usually in the form of hypofunction as evidenced by infantilism of the genital system, amenorrhea and sterility, though occasionally menorrhagias, particularly at puberty, and a tendency towards ovarian neoplasms, point to a hyperfunction of the ovaries. Frequently there are also secondary changes in the adrenals and hypophysis, the latter accounting for the short stature, the former for a premature arteriosclerosis. In general, then, there is a *universal* hypofunction of the endocrine system. Mild forms are by no means rare, and their recognition will guard the practitioner against a useless treatment of any local genital symptoms and guide him towards a truly causal therapy. that is, the relief of the hypothyroidism.

While, according to the convenient scheme suggested above, hyperfunction of the pituitary body and hypofunction of the ovaries are likely to be combined, there are also cases in which a coexistent hypofunction of both glands is found. In this condition of hypopituitarism, also called dystrophia adiposogenitalis, and often caused by destructive tumors of the anterior lobe of the hypophysis, we find an arrest of growth of the long bones, an accumulation of fat in the lower part of the body, chiefly the hips, and signs of cerebral pressure, such as headache. The associated ovarian hypofunction manifests itself in a masculine type of pubic hair, scantiness of axillary hair, adipose mammae with poor development of glands, marked hypoplasia of uterus, extremely small ovaries, lack of libido, sterility, and amenorrhea.

As a third illustration of the complicated problems before us, I choose chlorosis. This disease occurs only in the female during adolescence. It is characterized by an enormous reduction of the hemoglobin without a corresponding decrease in the number of the red blood corpuscles. Pallor of skin and paleness of lips and mucosae are striking. The signs are rapid fatigue, headaches, vertigo, palpitations, and dyspnea on slight exertion. Delayed and scanty menses or total amenorrhea indicate hypofunction of the ovaries, but there are many cases where, on the contrary, there are abundant hemorrhages at menstrual periods. As it seems unlikely that hypofunction and hyperfunction may produce the same disease, we must assume that we have to deal with a dysfunction of the ovaries; but we should confess to ourselves that this is merely an assumption, a label as it were, to cover our ignorance.

The complexity of the conditions, of which I have presented but a few examples, brings out in strong relief the incompleteness of our actual knowledge. The science of endocrinology is not nearly so fully developed as many enthusiasts would have us believe. Much of what we assume to-day may be true, but its correctness has not yet been established with absolute certainty. We must, therefore, be cautious in applying our present suppositions in practice and be very critical in evaluating the outcome of our treatment, for the treatment based on the studies of endocrine glands, the so-called organotherapy, necessarily reflects the fragmentary character of our knowledge and its successes and failures are correspondingly uncertain.

What little we know definitely about organotherapy will be mentioned in succeeding chapters. In the present chapter we are mainly concerned with the fact that disturbances of the endocrine glands represent constitutional anomalies, that in particular a disturbance of the ovarian secretion, either primary or secondary to disorders of other glands, may be responsible for a large number of genital symptoms which formerly were believed to be due to local affections within the genital sphere. More especially must this connection be remembered in all disturbances of puberty, menstruation, and climacterium, and it will become necessary to refer repeatedly to this relationship in the following pages.

THE RÔLE OF CONSTITUTIONAL ANOMALIES IN GYNECOLOGY AND OBSTETRICS

In the foregoing discussion allusion has been made frequently to the fact that the knowledge of these constitutional anomalies is not merely a scientific attainment. In view of the enormous importance of the subject, it may not be out of order to review briefly the eminently practical aspect of the question in the field of gynecology and obstetrics.

The abnormal mobility of the cecum in infantilistic persons and the wide, funnel-shaped opening of the appendix have been mentioned. Constipation or the very mildest forms of appendical irritation often lead to extensive adhesions which readily involve the uterus and the right adnexa and may, erroneously, be diagnosed as chronic oöphoritis and the patients subjected to useless local treatment. Nor is this the only possible diagnostic mistake; and I have operated twice within the last three years for an assumed left-sided pyosalpinx on patients in whom the movable cecum with its inflamed appendix was found adherent in the *left* lower abdomen. In the case of an abnormally long and movable sigmoid, the constipation to which the individual with an inferior constitution is particularly prone may give rise to adhesions eventually affecting the left ovary. Many years ago, Gersuny described these adhesions as congenital bands; to-day we must consider them as acquired through an infantilistic habitus.

This constipation, which is so obviously engendered by the distorted large bowel, is also often the cause of some of the disorders of the endometrium

and the ovaries. Hence, it would be illogical to treat the one with curettage, the other with tampons and douches, and to ignore the exciting cause which, in its turn, is due to infantilism.

The umbilicus of infantilistic patients is often moist and irritated. The practitioner who diagnoses an eczema and simply prescribes some ointment or lotion, overlooks the possibility of a patent urachus, for which a specialist should be consulted.

The individual with an infantilistic constitution begins to menstruate later than the normal girl and enters the menopause prematurely. In both instances an invigoration of the whole organism is the proper plan to follow, not this or that drug to bring on the flow. We have spoken above of the amenorrhea, oligomenorrhea and dysmenorrhea in these patients who, after they are married, also complain frequently of sexual frigidity and dyspareunia. No amount of medicines will be of avail *unless the whole organism is treated at the same time.* Sterility is common in this class of patients, and, if the anomaly is at all pronounced and the patient above the age of twenty, it is intractable. The intra-uterine stem, artificial insemination, and the like are, to say the least, meddlesome interventions in such cases. If conception has taken place, a number of different problems confront us. Habitual abortion is often the outcome, but the favorite treatment by curettage is, in these cases at least, a therapeutic monstrosity. If, however, gestation should continue to full term, we have to bear in mind that many of these patients have not only generally contracted pelves, but also a weakness of the uterine muscle which is apt to express itself in inertia and postpartum hemorrhage. More than ordinary care, therefore, is required, both during pregnancy and in labor, lest the physical and psychic strain prove too much for such an inferior organism, from which it can never fully recover. A cesarean section early in labor is, to my mind, imperatively demanded, though, of course, the abnormally small heart of the infantilistic person renders narcosis unusually hazardous. In the puerperium, the uterus is greatly in danger of undergoing a permanent lactation atrophy, and for this reason infantilistic mothers should not nurse their children. Operations should not be performed on infantilistic individuals except for very urgent indications such as mentioned above.

Infantilism of the tubes which the anatomist Tandler, in Vienna, found in more than 10 per cent of his material, may be one of the causes of ectopic gestation.

The asthenic type, in so far as it is not associated with the infantile, presents a number of practical problems of which the questions of enteroptosis and retroflexion are probably the most important. The era of operative furor is fortunately on the wane when every organ in the abdomen was sewed on in place and we used to read long lists of nephropexies, gastropexies, colopexies, and so forth and so on, but even to-day a word of warning against these operations in the asthenic patient may not be entirely out of order. That there is in such patients a lowering of all abdominal organs is beyond question; but as Mathes, perhaps the leading authority on the subject, insists, the thousand-and-one symptoms complained of are pri-

marily produced by the weakness of the nervous system, and this shows the absurdity of any surgical treatment.

The same is true of retroflexion. The congenital weakness of the muscles and fasciae of the pelvis deprive the uterus of its normal supports. The result is an abnormal mobility of this organ, which may to-day be in anteflexion and to-morrow in retroflexion. If we find such a condition in a young, nulliparous woman who, on careful examination, presents other signs of asthenia, we must naturally evaluate the displacement as different from one in a normally constituted woman, who may have acquired her ailment after a confinement. Whereas, in the latter, treatment with pessary or operation is the logical procedure, the asthenic patient needs general and psychic therapy rather than local treatment. The distinguishing feature between these two patients with retroflexion is the disproportion between the intensity of the complaints of the asthenic patient and the objective findings. Both may have backache, discharge, constipation, menorrhagia and dysmenorrhea, but in the otherwise normal woman we find a heavy, subinvoluted and congested uterus; in the asthenic, a freely movable organ of ordinary size. The observant physician cannot fail to notice these striking differences and to draw from them his therapeutic deduction. Too many practitioners, unfortunately, are remiss in this respect. The various symptoms are treated injudiciously with various local procedures, then follows an operative shortening of the ligaments, and when the suggestive effect of the operation has worn off, another surgical intervention, until, finally, the abdomen is covered with scars, peritoneal adhesions produce *genuine* distress, and the patient is rendered a hopeless invalid. What experienced practitioner has not seen such victims of lack of medical judgment!

The consideration, then, of the constitution of the patient must be uppermost in our minds when we are called upon to diagnose and to treat any gynecologic ailment.

Regarding endocrine anomalies of constitution, there is still too much that is merely hypothetical to be of practical value. Yet in some gynecologic disturbances the connection already appears well established. Take, for instance, the menorrhagias of young girls, a condition which almost always is caused by hyperfunction of the ovaries. A curettage seems to be the very last thing to be thought of, and yet it is only too often the first suggestion made by the practitioner. Another anomaly which probably goes back to the endocrins is the spasmophilia, the tendency to spastic contractions of many unstriped muscles. To the gynecologist the spasmophilia of the uterus is of particular interest, and we shall discuss this subject more fully in the chapter on dysmenorrhea.

Here, too, the interrelationship between diabetes and the female genitalia is of practical importance and it suffices to point out that diabetes may cause sterility and pruritus vulvae and that, on the other hand, pregnancy or operations may greatly aggravate an existing diabetes. Finally, we are well acquainted with the influence which the endocrine obesity exerts in amenorrhea and sexual frigidity.

This list, however, is far from being complete. Only headlines, as it

were, could be given in order to call attention to the intricate and far-reaching effect of constitutional anomalies in the field of gynecology and obstetrics. The true appreciation of these factors widens our horizon immensely and elevates us above the purely mechanical attitude of former days.

TREATMENT OF CONSTITUTIONAL ANOMALIES

If symptomatic treatment, as I have attempted to show in the foregoing pages, is only of secondary value or altogether superfluous, if not harmful, what, then, is the proper treatment of constitutionally inferior individuals?

The answer is: *General Hygiene.* In the management of life such as these patients need, air and sunshine are the first and foremost necessities. Systematic physical exercises in well ventilated rooms or, better still, in the form of outdoor sports, are equally essential. Each case must be individualized. A greatly weakened organism may have to be prepared by massage before it can take up active exercises. The latter must be carried out systematically and gradually increased in proportion to the ability of the patient. Of the various sports, walking, swimming, and skating must be indorsed as best suited. One has but to see girl scouts returning from a cross-country hike with elastic step and happy faces, shining eyes, and rosy cheeks to be convinced of the value of sustained exercise in the open upon the body and soul of the growing generation. Rowing, tennis, and bicycling should be suggested where circumstances permit, but in all sports overstraining and fatigue must carefully be avoided. The physician has ample opportunity to place his advice at the service of his patients.

The diet must be supervised. It must be strengthening and at the same time counteract the tendency to constipation. Hence it should consist, in the main, of vegetables, fruits, cereals, coarse bread, butter, honey, marmalades, etc., with only a modicum of meat and eggs. An abundance of water is required between meals; further, milk, buttermilk, lemonades. Coffee, tea, and alcoholic drinks must be interdicted.

The need of rest is particularly pronounced in the constitutionally inferior person. "Early to bed and early to rise" is a good slogan for asthenics, young and old, and a nap after the midday meal, without shoes and corsets, is of the very greatest benefit. It is gratifying to know of certain enlightened store owners who provide for rest rooms, where their female employees may lie down in the middle of the day. If the appreciation of the hygienic value of this provision were more general, we would, perhaps, see fewer exhausted factory workers, anemic shopgirls, worn out seamstresses and teachers. Even among the well-to-do, this elementary knowledge is woefully lacking, and we see "debutantes" and their older sisters, married and unmarried, in a ceaseless haste, slaves to the demands of self-imposed social duties.

Add to these suggestions certain medicines which either stimulate, or substitute for, the insufficient secretion of endocrine glands, and you have, in a general way, the measures by which metabolism is intensified and a better

development of the body accomplished. As the genital organs are but a part of the entire economy, these, too, are apt to be benefited to a more or less marked extent. Even where the age of the patient or the high degree of the constitutional anomaly preclude a complete cure, there is at least a possibility of enabling the individual to carry the burden of life with greater ease.

LITERATURE

Hermaphrodism

Ballantyne. In Obstetrics and Gynaecology, edited by J. S. Fairbairn, 1921, 536.
Neugebauer, von. Samml. klin. Vortr., 1905, No. 145.
Pankow. In Menge-Opitz: Handb. d. Frauenheilk., 1913, 483.

Infantilism and Asthenia

Bab. Samml. klin. Vortr., 1909, No. 198, 200.
Mathes. In Nothnagel's Spezielle Pathologie u. Therapie, 1913, vii, 2: 363.
Stiller. Die asthenische Konstitutionskrankheit, 1907.
Stratz. Die Schoenheit des weibl. Koerpers, 1899, 54.

Endocrines

Aschner. Die Blutdruesenerkrankungen des Weibes, etc., Wiesbaden, 1918 (with complete literature).
Barker. Endocrinology and Metabolism, D. Appleton & Co., 1922.
Frank. Gynecological and Obstetrical Pathology, D. Appleton & Co., 1922.
Graves. Gynecology, 2d ed., Philadelphia and London, 1918.
Jaschke, von, and Pankow. Lehrbuch der Gynaekologie, 6th ed., Berlin, 1921.
Koblanck. Taschenb. d. Frauenheilkunde, 3d ed., Berlin, 1921.
Mayer. München. med. Wchnschr., 1923, 69: 1718.
Menge. In Menge-Opitz, Handb. d. Frauenheilk., Wiesbaden, 1913.

CHAPTER IV

DISTURBANCES OF MECHANICS

DISPLACEMENTS

The uterus occupies approximately the center of the pelvic cavity. The cervix points backward and downward into the hollow of the sacrum to about where sacrum and coccyx are joined together. The body of the uterus leans forward in the direction of the symphysis (anteversion) and at the same time is bent slightly from the cervix (anteflexion) so that the two parts of the organ form an obtuse angle with the opening downward. The axis of the uterus, therefore, is not a straight line, but is gently curved. We call this combination of anteversion and anteflexion the normal position of the uterus because we know, from the fundamental investigations of B. S. Schultze, that it is present in the vast majority of women who enjoy an undisturbed state of health (Fig. 14).

How is the uterus maintained in this normal position? The so-called ligaments of the uterus, which formerly were credited with suspending the organ at the proper level, cannot possibly fulfill this function. They are merely lax folds of peritoneum, containing a small quantity of connective tissue, with here and there a few feeble fibers of unstriped muscle, and even the parametria, or bases of the broad ligaments, which are composed of relatively more muscle fibers, connective tissue, and strands of fascia than any other ligaments, are not strong enough to offer more than a certain amount of resistance to any gross displacement of the uterus. One can easily prove this in the course of a laparotomy when the uterus may be pulled up to, or even through, the abdominal incision without any undue force. The prevailing conception to-day is that the physiologic importance of the uterine ligaments becomes manifest in pregnancy, labor, and puerperium when the enormous changes in the size and position of the uterus require loose attachments, while, in the non-pregnant state, they take only a very secondary rôle in the maintenance of the position of the uterus.

The uterus can be *supported,* in the true sense of the word, only from below, where it rests upon a massive formation of muscular and fascial structures which, collectively, are termed the pelvic floor, not to be confused with the perineal body which is but a part of it. The lower aperture of the pelvic cavity is closed below by a powerful muscle, the levator ani, which is spread across the open space like a hammock (Fig. 15). The levator ani may be divided into two main portions. The anterior portion, also designated as the pubococcygeal muscle, arises on either side, from the back of the pubic bone near the symphysis; the posterior portion, also called the ilio-

coccygeal muscle, arises from the "white line," a fibrous arch extending from the pubic bone to the ischial spine. These two portions, which are contiguous, extend backward and inward and insert partly into the last sacral vertebra

FIG. 14.—SAGITTAL SECTION THROUGH ADULT BODY, SHOWING THE NORMAL POSITION AND RELATIONS OF THE UTERUS, BLADDER, RECTUM, AND ABDOMINAL WALLS (from Kelly, *Operative Gynecology*).

and partly into a tendinous median raphé behind the rectum, where they unite with their fellows from the opposite side. In converging, the two muscles form the slightly funnel-shaped structure which has been likened above to a

hammock and which, from now on, will be designated as the levator ani. Those muscle bundles which arise from the pubic bone are of particular practical importance, since they connect with the lateral walls of the vagina and the anterior wall of the rectum and, in a way, act upon these two structures as if they were sphincter muscles. This can easily be demonstrated, if, after the insertion of a finger into the vagina or rectum, the patient is asked to raise

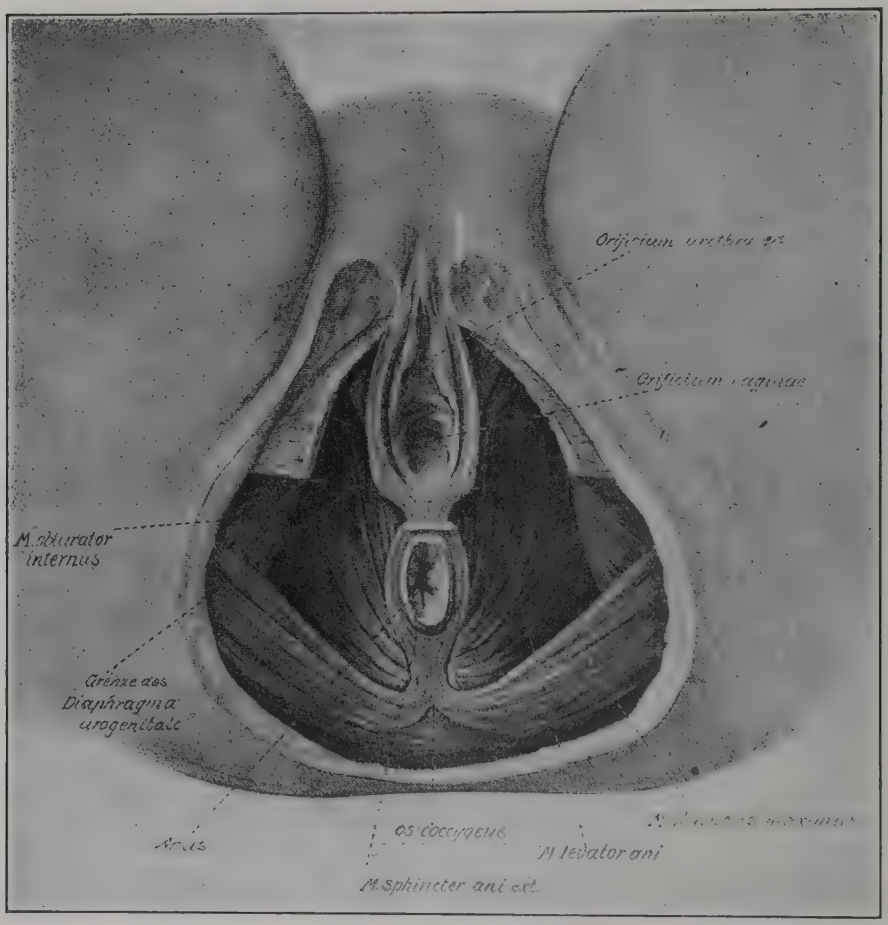


FIG. 15.—TOPOGRAPHY OF THE LEVATOR ANI MUSCLES (from Döderlein and Kroenig, *Operative Gynäkologie*).

her hips and at the same time contract her rectum as if trying to prevent defecation. The levator fibers can then be felt as strong cords which constrict the vagina and rectum.

In close connection with the levator ani is the coccygeus or ischiococcygeal muscle which, on either side, arises from the ischial spine and is inserted into the lateral aspect of the lower sacral vertebrae and the coccyx. The totality of these muscles which close the pelvis below is completely enveloped in strong sheets of fascia, whereby the strength and resistance of the pelvic floor is

greatly increased. We attach the name *pelvic diaphragm* to this group of musculofascial structures.

The pelvic diaphragm has but one weak spot, namely, the cleft between the anterior or pubic bundles of the levator muscles where urethra and vagina are located. This cleft, or *hiatus genitalis,* is quite narrow in the nulliparous woman. After childbirth, however, the aperture becomes wider because the muscle fibers are more or less torn or at least overstretched in labor. There is, therefore, need for a reënforcement of this weak portion of

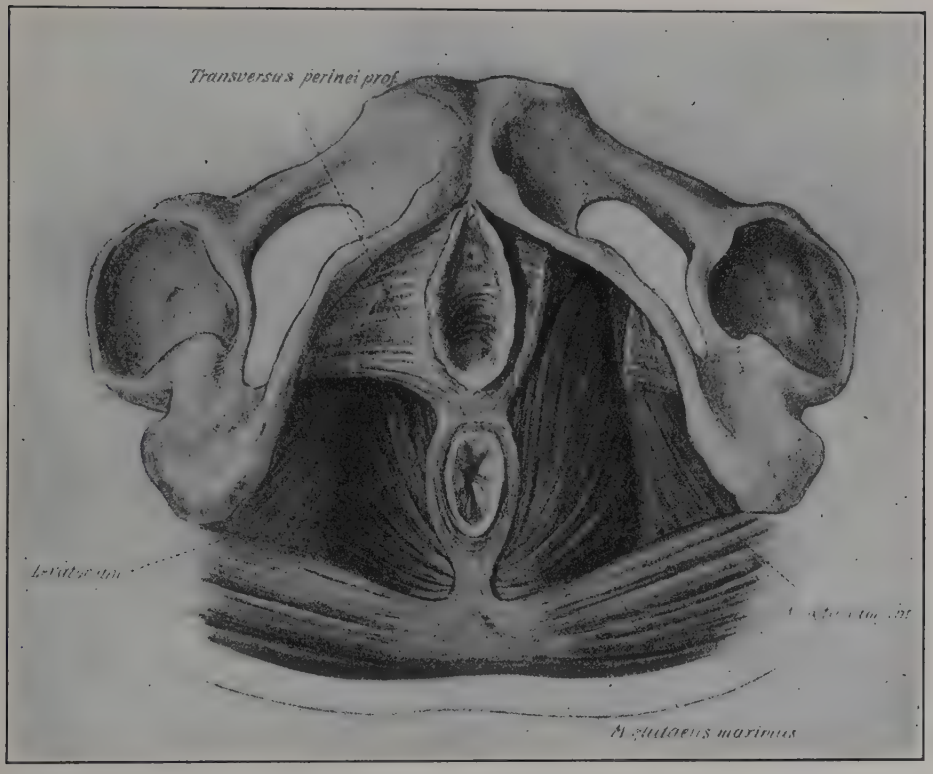


FIG. 16.—TOPOGRAPHY OF THE URO-GENITAL DIAPHRAGM, WITH THE DEEP TRANSVERSUS PERINEI MUSCLE (from Döderlein and Kroenig).

the pelvic diaphragm, and such a reënforcement exists in the form of the *triangular urogenital diaphragm* which stretches across and closes the pubic arch (Fig. 16). It inserts, on either side, at the descending ramus of the pubic bones and is composed in the main of the deep transversus perinei muscle which is encased between the two layers of the perineal fascia. This musculofascial diaphragm is perforated only by the urethra and the vagina, and in order to make these two openings still more secure, there are, upon the nether side of the deep transversus perinei, the rather delicate sphincter muscle of the vagina, or bulbocavernosus, and the superficial transversus perinei (Fig. 17). The fibers of these muscles connect with the sphincter ani muscle.

The pelvic floor in its entirety, then, consists of two musculofascial diaphragms, one beneath the other, which close the pelvic cavity below and form a strong hammock upon which the uterus rests securely. The weight of the intestines upon the back of the uterus and the effect of intra-abdominal pressure are additional factors in keeping the uterus in its normal position.

The uterus never remains in this normal position for any length of time. Slight temporary deviations occur constantly with every breath. The impulse of the expanding lungs is transmitted through the viscera to the uterus. One

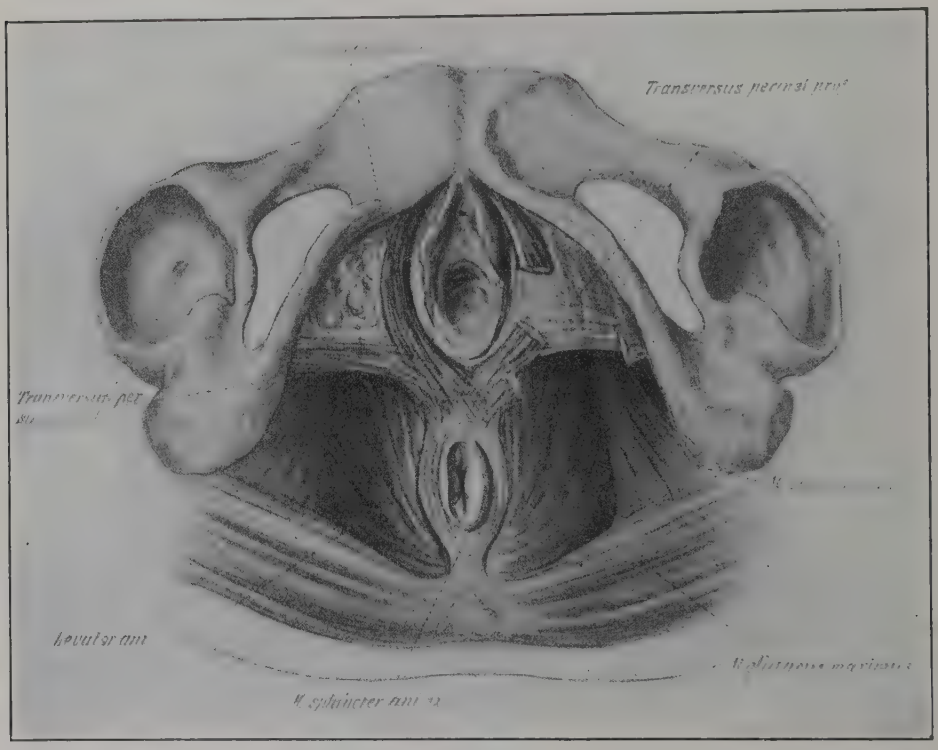


FIG. 17.—TOPOGRAPHY OF THE SUPERFICIAL MUSCLES OF THE PELVIC FLOOR COMPOSING THE PERINEAL BODY (from Döderlein and Kroenig).

can easily watch this phenomenon by inserting into the uterus a thin sound which then registers the movements of the organ. Any change in the position of the individual produces a corresponding change in the position of the uterus. The filling of the bladder forces the body of the uterus upward until the axis of cervix and body form a straight line, and an overdistention of the bladder will even throw the body backwards towards the sacrum (Fig. 18). A loaded rectum pushes the whole uterus upward and forward.

All these deviations are only transient, and with the cessation of these physiologic alterations, the uterus normally returns to the original position described above.

Only when the dislocation of the organ remains permanent may we speak of pathologic displacements. Because of the inherent mobility of the uterus, a great many different displacements may occur (Fig. 19). An accumulation

of fluid in the culdesac, for instance, may push the uterus forward and nearer to the symphysis (*anteposition*); or the shrinking of an exudate in the pouch of Douglas may pull the organ closer to the sacrum (retroposition). A tumor in one side of the pelvic cavity may dislodge the uterus towards the other side (*sinistroposition* or *dextroposition*). Again, the retention of menstrual blood in the vagina may raise the uterus above the brim of the pelvis (*elevation*), or the weight of a tumor from above may depress it below its normal level (*descent*). There are also all possible combinations of displacements,

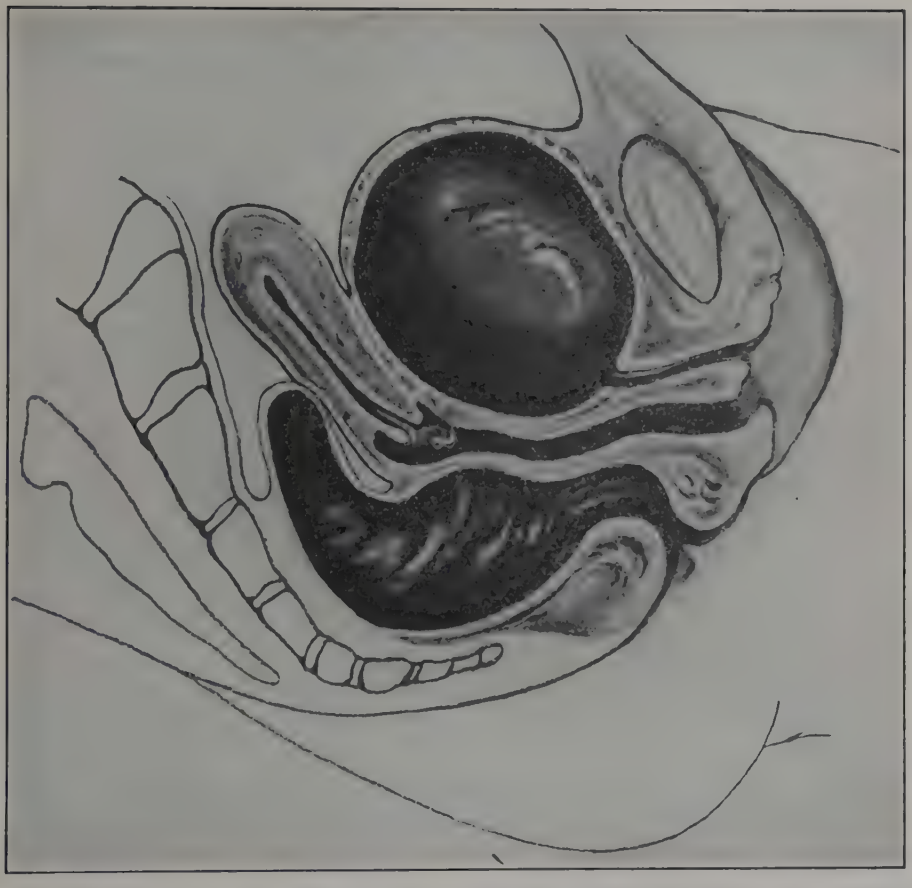


FIG. 18.—THE FILLING OF THE BLADDER STRAIGHTENS OUT THE UTERINE AXIS AND PUSHES THE BODY BACKWARD TOWARD THE PROMONTORY.

as, for instance, in the case of an intraligamentous ovarian cyst which will cause at the same time a lateroposition and elevation, or of a fibroid in the anterior wall of the uterus which may produce both a descent and a retroflexion. In all such cases, however, the displacement is secondary to the main pathology and the treatment must be directed, in the first place, to the underlying etiologic factor. For practical purposes we have to consider only the following four forms of displacement: (1) Pathologic anteversion and anteflexion; (2) Retroversion and retroflexion; (3) Prolapse; (4) Inversion.

Antedisplacements.—Anteversion.—The uterus normally lies in anteversion which is combined with a slight anteflexion. If, however, this gentle anteflexion is absent so that the axis of the entire organ is in a straight line, we speak of an anteversion which is pathologic *only* if the uterine body is permanently lower than the cervix (Fig. 20), so that it presses heavily upon the bladder while the cervix points straight backward or even upward and the external os can barely be reached with the examining finger. The entire organ is thick and heavier than normal and presents to the examiner the sensation of unnatural hardness and rigidity. This is due to the fact that the condition, in most cases, is a sequela to subinvolution. Less frequently it is adhesions which bind the anterior surface of the uterus to the bladder or

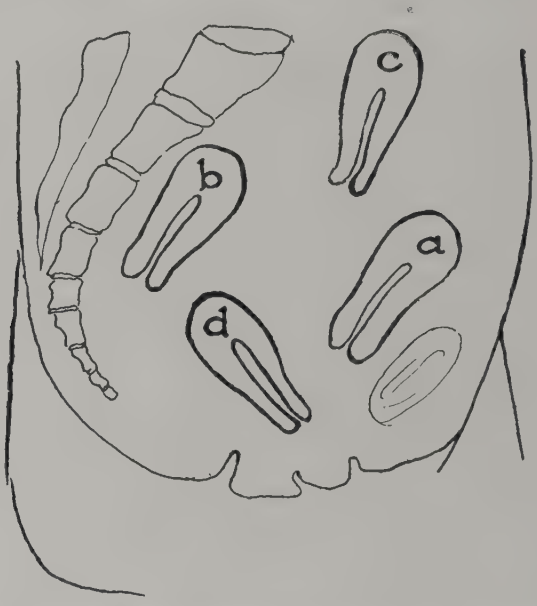


Fig. 19.—Diagram of Various Displacements (*a*) anteposition; (*b*) retroposition; (*c*) elevation; (*d*) descent.

abdominal wall; or a shrinking exudate will pull the cervix upward and toward the posterior pelvic wall, whereby the body is tilted forward.

There has been a tendency in recent literature (Halban, Fairbairn) to eliminate this position altogether from the list of pathologic displacements, but the fact remains that, in cases of this kind, there is a frequent desire to urinate and a sensation of weight and bearing down which cannot simply be brushed aside as "nervous" or "imaginary," but which, combined with the symptoms of the underlying cause, call for treatment.

The object of treatment is to reduce the size and weight of the uterus and, thereby, ease the pressure upon the bladder which interferes with the normal capacity of the latter. If the subinvolution is of very long standing and the fibrous changes of the uterine musculature very pronounced, treatment is not promising; yet an attempt at depletion should be made. This is best done by means of scarification, glycerin tampons and protracted hot douches.

The technic is simple, but requires perseverance on the part of the patient. Even a slight reduction in the weight of the uterus gives considerable comfort.

The same treatment will often suffice to soften the scar tissue behind and to release the fixed and elevated cervix; in connection with it, the colpeurynter (page 330) will be of decisive value.

In the presence of adhesions, surgical intervention is indicated, if the symptoms justify the operative risk.

ANTEFLEXION.—In normal anteflexion the angle between body and cervix is wide, obtuse; in pathologic anteflexion it is acute.

FIG. 20.—ANTEVERSION OF THE UTERUS. The cervix points backward to the sacrum, the body forward upon the bladder and anterior vaginal wall. The long axis of the uterus is straight. The uterine body is lower than the cervix (from Findley, *Diseases of Women*).

Pathologic anteflexion may be either congenital or acquired; the former is the more frequent, but neither is very common. In the congenital type the uterus is usually very small, owing to deficient development of the organ. In the acquired form a shortening of the sacro-uterine ligaments pulls the upper part of the cervix upwards and backwards, with the result that the body tilts forward at a sharper angle.

The diagnosis of both types is rather easy. In extreme forms of congenital anteflexion the body is so acutely bent that it can be felt in front of the cervix with the inner fingers. The small size of the whole organ must lead to search for other characteristics of general infantilism and asthenia. In the acquired form, the cervix points forward in the axis of the vagina; the upper part of the cervix leads towards the sacrum so as to simulate a retroversion, but, on careful palpation, the fingers in the anterior fornix will reach

the body and determine its connection with the cervix. Very occasionally, examination in narcosis is needed, if the abdominal walls are too thick or resistant. Unless the changes are very obvious, a diagnosis of *pathologic* anteflexion should be made only if the uterus is abnormally small, or if chronic inflammatory findings in the posterior parametrium are present.

Patients with congenital anteflexion suffer intensely from *dysmenorrhea,* severe backache and colicky pain in the abdomen which precedes the menstruation and continues for a day or two. The latter is often scanty; in some cases the blood coagulates in the uterine cavity and the clots are expelled by laborlike contractions. The former view that the retention of blood was due to a stricture at the sharp angle in the uterine canal has now been abandoned to a large extent, because it has been proved time and again that a sound could, in most instances, easily be introduced without meeting with an obstruction. It is much more likely that the menstrual disturbances in such patients are due to constitutional anomalies which, in their turn, create a tendency to spasms of the uterine muscle at the internal os. More detailed reference is made in the chapter on dysmenorrhea.

The treatment, therefore, should, primarily, not be local, particularly as, in the majority of the cases, we have to deal with young girls. Rather should it be directed towards the strengthening of the weak physical constitution and a building up of the nervous equilibrium by means of psychotherapy (Chapter XXI). This general régime should be supported by atropine treatment (page 237) and, if the latter fails, by nasal therapy (page 332).

Sometimes all these means prove insufficient, and we are forced to go a step further and perform a dilatation of the cervix. This measure often brings relief, though it usually lasts only a short time, a year at best. This is by no means the only example in medicine of the fact that a procedure theoretically unsound may at times give unexpectedly good results.

In virginal patients this procedure requires a general narcosis. In married women local anesthesia may be employed with advantage (page 302). In a few fortunate cases pregnancy may follow, and a permanent cure may then result. Where *sterility,* which is the second of the principal symptoms of congenital anteflexion, persists, it is probably due not so much to any stenosis, as to the deficient development of the organ, a hypoplasia of the uterus. Attempts to stimulate the development of the uterus by the electric current have been made, but generally have proved unsuccessful. The subject is more fully discussed under the head of sterility.

Very little need be said about the treatment of *acquired* anteflexion. Here we have to treat the cause, that is, the retracting inflammation of the sacro-uterine ligaments. Hydrotherapy in the form of baths and douches, tampons, or the mercury colpeurynter are, therefore, in order. Pessary treatment is incorrect, and an operative shortening of the round ligaments or a fixation of the uterus on the abdominal walls is even more illogical, because the backache is only intensified by the stretching of the inflamed peritoneal folds.

Retrodisplacements.—If the body of the uterus sinks backward and the cervix moves forward towards the symphysis, we speak of a *retroversion.*

If, in addition, the body is more or less sharply bent from the cervix so that the fundus glides into the culdesac, we have to deal with a *retroflexion.* In the former, the uterine axis is straight, in the latter it represents an angle; in both the fundus remains in or near the sacral hollow. From a practical standpoint, the backward displacements are the most frequent and the most important, and as retroversion and retroflexion have about the same causes and symptoms and require the same treatment, they may be considered together, the term retroflexion including both anomalies.

Retrodisplacements are either congenital, or, more often, acquired.

Congenital.—By making longitudinal sections through the frozen bodies of newborn, Mackenrodt, some thirty years ago, found the uterus in retroflexion in a certain number of cases and thereby proved the congenital nature of some retroflexions. As children with this anomaly grow into girlhood and womanhood, two alternatives may happen:

1. The physical development may be perfectly normal, that is to say, the general habitus as well as the nervous equilibrium are those of entirely healthy individuals. The uterus likewise attains normal growth and proportions. The retroflexion is merely an accidental mutation, a freak of Nature; it represents the *normal* position for this comparatively small class—just as the occasional discovery of a situs inversus in certain people does not denote a pathologic condition in these persons. Such women will have no symptoms due to the position of the uterus; in fact, the recognition can only be accidental. It is probably this class of cases that has given rise to the statement that retroflexion, as such, causes no disturbances and, therefore, requires no special treatment. I consider this assertion, which has been the keynote of many heated discussions, as exaggerated. I admit that it is correct *only* so far as the small category of cases is concerned which is mentioned here. In the vast majority of cases, particularly those of acquired origin, retroflexion has a definite clinical dignity.

2. Another class of cases of congenital retroflexions undergo an entirely different course of development. These are the slender girls with poorly developed musculature, pale complexion, long necks, sloping shoulders, narrow and flat thoracic cavities and more or less protruding abdomens—in short, representatives of infantilistic asthenia with many or all the physical and mental stigmata of that make-up. Here the behavior of the uterus is but a partial expression of the general habitus. The uterus is underdeveloped like the rest of the body. The cervix is considerably longer than the fundus and is pulled forward by the abnormal shortness of the anterior vaginal wall. The fundus is, in size, but an appendix to the cervix and is acutely flexed upon the latter. It need not always lie in retroflexion, but it often does. This type of patient is given consideration in Chapter III. It may suffice here to say that such patients invariably complain of scanty and painful menstruation, backache, intermenstrual pain in various parts of the body, but particularly in the abdomen, headache, and a host of other more or less well-defined symptoms, the totality of which makes life for them a constant and almost unbearable struggle and a problem of perplexing diffi-

culty to the attending physician. Here, if anywhere, it is necessary not to forget the organism in considering the organ.

The diagnosis of a congenital retroflexion, based upon the shortness of the anterior vaginal wall, the great length of the tapering cervix, the smallness of the sharply flexed corpus is easy enough, but it would be more than wrong to ascribe all the patient's ills to the displacement and to try to cure them by correcting the position of the uterus. Such a course would only make matters worse. As it is, the thoughts of the patients are too much centered upon the genital sphere, and any attempted local treatment must needs confirm that faulty attitude. Dilatation, tampons, pessaries, intra-uterine stems, electricity, etc., are totally useless, and their employment will only discredit these otherwise valuable methods of treatment. Least of all should such patients be operated upon. The surgeon who anchors the uterus forward in a case of this kind starts his patient on a trail that is bound to end in a confirmed and incurable invalidism.

These patients should not even be told that the uterus lies in an abnormal position. What they need is a general treatment directed towards modifying, if possible, their general infantilism. What general hygiene, an outdoor life, iron, endocrines, psychotherapy may accomplish under favorable circumstances has been told elsewhere.

Summing up, then, I will say: Hands off the uterus in cases of congenital retroflexion!

1. Acquired.—Acquired retrodisplacements present an entirely different picture.

The causes of acquired retroflexion may be grouped in three classes: (1) Puerperal; (2) Traumatic; (3) Secondary to inflammatory and other conditions outside the uterus.

Puerperal.—This cause is by far the most frequent. Several authors ascribe to it more than 75 per cent of the displacements. Olshausen claims that 90 per cent of all retroflexions are due to a previous labor or miscarriage. It is, indeed, easy to understand how involution in the puerperium or after an abortion prepares the field for a retroflexion. The lower uterine segment and cervix, which have been thinned out in pregnancy and labor more than any other part of the birth canal, retain their laxness for quite a while during the puerperium. The result is, normally, that the heavy uterine body temporarily assumes a rather acute anteflexion within a week after labor, but, with the gradual recovery of the cervix, the body eventually regains its normal degree of flexion. A number of factors, however, may combine to prevent the restoration of the normal position. The prolonged position of the patient on her back favors the sinking backwards of the whole uterus. The capacity of the bladder in the puerperium is increased and, as many patients void all too infrequently, the overdistended bladder pushes the fundus backward. If intestinal loops enter into the vesico-uterine pouch, the intra-abdominal pressure is exerted upon the anterior, instead of the posterior, aspect of the organ as normally, so that the fundus is easily forced beyond the promontory into the sacral hollow. The pelvic floor, finally, if it is not actually injured in childbirth, is so weakened by overstretching during labor

and the inactivity of the lying-in state, that it cannot hold the uterus at its proper level. The intra-abdominal pressure, therefore, has an even better chance to attack the anterior surface of the fundus to complete the displacement. If retroflexion occurs rather easily after a perfectly normal labor, how much more frequently must it follow instrumental delivery or puerperal infection. There would be subinvolution of the uterus or lacerations of the pelvic floor, or infection of the pelvic peritoneum with formation of adhesions and other factors which tend eventually to uterine displacement. The practical application of these points will be made clear later.

Traumatic.—The traumatic origin of retroflexion is very much less frequent. To be sure, all kinds of claims are made against railroad and street-car companies in cases of a wreck or collision and are usually sustained by the jury, expert testimony to the contrary notwithstanding. The patients of this sort are either neurasthenics or malingerers whose symptoms disappear as soon as damages have been paid. Still the possibility of a traumatic retroflexion cannot altogether be denied. I have repeatedly seen cases of this kind following a fall from a horse or a stepladder. A full bladder at the time of the accident seems to be the deciding factor. Quite recently I was called to see a young woman, an acrobat, whose performance consisted of being suspended by her toes from the rings of a trapeze and holding her husband while he executed his acrobatic feats. One night as she raised herself up into sitting posture, she felt an excruciating pain in the lower abdomen and had to be carried home. I found the uterine body deep in the culdesac and incarcerated between the sacro-uterine ligaments. Reposition of the organ was easy and was followed by instantaneous relief.

To this category of traumatic retroflexions belongs the so-called "virginal" retroflexion in schoolgirls who have acquired the bad habit of neglecting urination; the overdistended bladder pushes the uterine body back, the intra-abdominal pressure now exerted from the front does the rest. I remember quite a number of school-teachers in whom a history of such bad habits was the only etiologic clew for the existing retroflexion.

Inflammation and other external conditions.—There are, finally, cases in which an inflammatory process in the culdesac, the weight of a pyosalpinx, perhaps, or the pull of a contracting exudate, or adhesions from a pelvic peritonitis, causes a retroflexion to occur secondarily, or where a tumor, such as a fibroid in the anterior wall or a dermoid cyst of the ovary, pushes the fundus into the hollow of the sacrum.

What happens when, for any of the reasons enumerated, the uterus falls backward?

The uterus drags the tubes and ovaries along and necessarily exerts a pull and a twist on the broad ligaments which contain the blood supply of the internal genital organs. While the arteries, owing to their more resistant muscular walls, are not affected by the kinking and stretching of the broad ligaments, the weaker walls of the veins are liable to be compressed so that the return flow of venous blood may be impeded. The inevitable result is a congestion in which both the muscular walls and mucous lining of the uterus participate. A congestion must lead first to an edema and, if the congestion

persists, the edema will be transformed into tissue proliferation. Thus we see in retroflexion of long standing that the walls of the uterus become thick and hard while in the mucosa the glands increase both in size and number. This increasing weight of the uterus which we term, rather inaccurately, chronic metritis, impresses itself upon the patient as a sensation of heaviness, fullness and bearing down. The changes in the uterine mucosa, traditionally called chronic endometritis (though in this connection the terms "metritis" and "endometritis" are misnomers as they have nothing to do with infections or inflammations), manifest themselves in increased secretion which, at first, is purely seromucous, that is, white or colorless, but may soon become yellow when a slight infection from the bacteria living in the vagina has taken place. This "leukorrhea" is, as a rule, not irritating but sufficiently annoying to cause the patient to seek relief.

The existing congestion becomes greatly aggravated when, at the monthly cycle, the menstrual afflux of blood is added to the large amount of blood already present in the uterus. The menstrual flow, therefore, is profuse and these menorrhagias may, in the course of years, assume alarming proportions and produce a marked degree of anemia. Nor will the copious menstruation cease at the time when the climacterium usually sets in, and we thus see that, in many cases, a retroflexion is responsible for a delayed menopause. Again, during lactation, when menstruation is ordinarily absent, retroflexion, by virtue of the congestion, may produce menstrual bleeding.

The tubes and ovaries, as we have seen, are always displaced by the pull of the retroflexed uterus and may even be buried beneath the latter. They are affected as much as the uterus by the venous congestion. The tubes, therefore, are swollen and bluish-red in color, and in the ovaries a thickening of the outermost layer, the so-called tunica albuginea, takes place. The graafian follicles are now prevented from bursting at the regular periods of ovulation. At each period another little cyst is thus added to the number present until, finally, the entire peripheral zone of the ovary may become honeycombed. The tunica albuginea will stretch to a certain extent so that the ovary will grow larger. Meanwhile the imprisoned ripe follicles crowd one another for lack of space; the thin walls separating them break from pressure atrophy, and a number of these cavities blend, thus forming one or more small cysts, a condition which we term the small cystic degeneration of the ovary. A sensation of persistent soreness in one or both groins is the outward expression of the increasing tension of the tunica albuginea, and this ache increases to a more pronounced pain as each new follicle reaches its maximum distention on the approach of menstruation.

Thus far the malposition has affected only the structure of the uterus and its appendages, but it will be found in many cases that the surroundings of the internal genital organs are also implicated. The retroflexed uterus loses its physiologic mobility. It is a well-known fact that, if any organ lies motionless within the abdominal cavity, the permanent contact between the parietal and visceral peritoneum produces superficial pressure necrosis of the very delicate surface epithelium and that the two surfaces grow together. We employ this principle in abdominal surgery when we insert Lembert's

sutures in intestinal anastomoses, or when we close inguinal and abdominal hernias. In exactly the same fashion may the retroflexed uterus and its appendages gradually become adherent to the peritoneum of the culdesac and the rectum. In course of time these adhesions may become quite firm and extensive.

The base of the bladder is intimately connected with the upper part of the cervix. In retroflexion this portion of the bladder is pulled backward

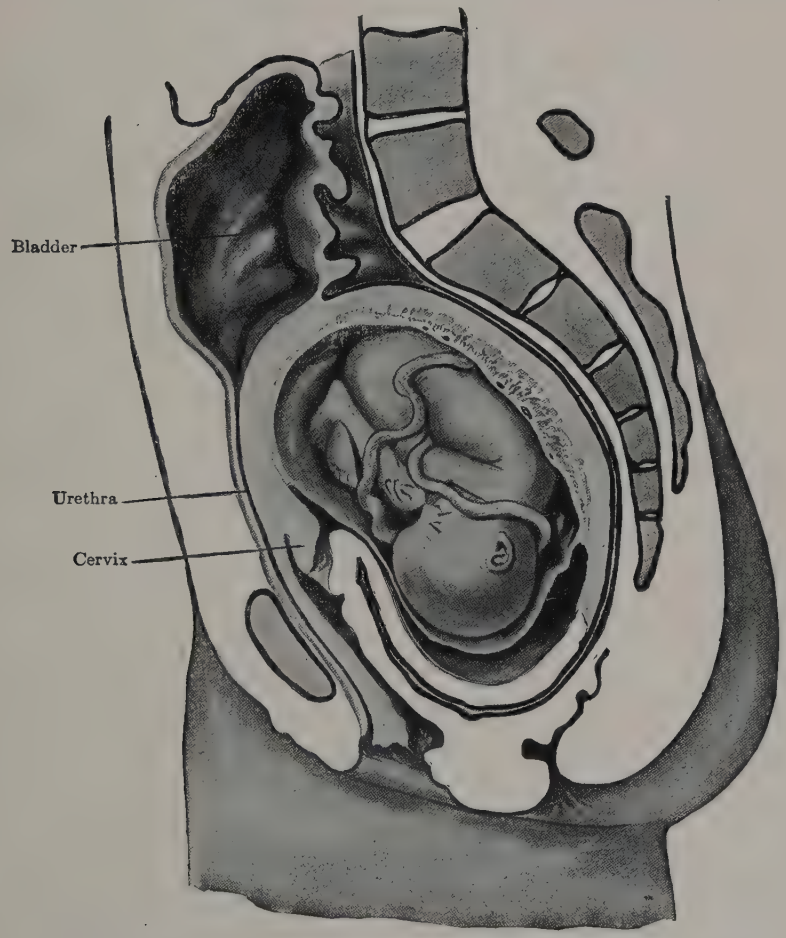


FIG. 21.—INCARCERATION OF THE RETROFLEXED GRAVID UTERUS WITH GANGRENE OF THE BLADDER (from De Lee, *Principles and Practice of Obstetrics*).

and the resulting deformity lessens the distensibility of the bladder, causing, in most cases, a frequent desire to urinate. Where the retroflexion is associated with a relaxed vaginal outlet or an overstretched urogenital diaphragm, there is also a partial incontinence of urine on laughing, coughing, sneezing, etc. These vesical symptoms are greatly aggravated in retroflexion of the pregnant uterus (Fig. 21) and may then even lead to the so-called *ischuria paradoxa,* a retention of urine where the bladder is enormously distended and only the overflow constantly escapes in involuntary dribbling. Ammoniacal

decomposition of the remaining urine may cause a gangrenous cystitis, and a fatal issue is by no means a rare occurrence in these complicated cases.

Another organ which is always affected by the uterine displacement is the rectum. The heavy uterus compresses the rectum and thereby produces constipation. The patients themselves feel an obstacle to defecation which becomes painful on straining. There is, furthermore, a mechanical disturbance in the venous circulation of the rectum which either produces or aggravates already existing hemorrhoids.

At the same time there is a pressure exerted on the sacral nerves, thus producing the most common symptom of retroflexion, namely, backache, which is usually localized in the lower part of the lumbar spine or the sacrum. If the uterus, which hardly ever lies exactly in the median line, rests on one of the sacral plexuses, the patients complain of pathologic sensations in the corresponding lower extremity. These sensations may vary in intensity from simple numbness to complete paresis.

It is generally conceded that retroflexion in many, though by no means in all, cases causes sterility and this is presumably due to the fact that the cervix, pointing forward, cannot dip into the pool of seminal fluid deposited at coition in the posterior fornix. The promptness with which conception sometimes follows our therapy has almost the value of a laboratory experiment. Where sterility persists in spite of treatment, one may, in the absence of other causes, have to think of unfavorable structural changes in the uterus or ovaries. In some cases it seems possible that the tubes are kinked in such a way as to bar the passage of the spermatozoa; or the sperma but not the fertilized ovum may pass through the obstacle in the tube. These may be the cases of ectopic pregnancy in which, on operation, we find no trace of old adhesions or other anomalies of the internal genitalia.

Again, if conception did occur in a retroflexed uterus, abortion is liable to happen, perhaps because of the ease with which hemorrhages may take place in the excessively hyperemic mucosa. Of course, the pregnant uterus may right itself and pregnancy continue undisturbed, but, in my experience, miscarriage is the more frequent outcome.

With perfectly normal genitalia, menstruation is practically painless. In retroflexion, on the other hand, there is always more or less dysmenorrhea. The explanation is simple enough. Not only is the amount of menstrual flow greatly increased, but the endometrium is thickened and the folds of the swollen mucosa close the narrow internal orifice in the manner of a valve so that the menstrual blood must, for a certain length of time at least, be retained within the uterine cavity, thereby distending the latter and acting like a foreign body of which the uterus tries to rid itself by laborlike contractions.

All that has been said applies primarily to an uncomplicated retroflexion. Where the malposition is due to causes outside the uterus, dysmenorrhea, as well as some of the other complaints analyzed, is naturally intensified by the complicating disease. These, then, are the symptoms as they grow out of the disturbed mechanics of the pelvic viscera.

It is much less easy to explain the profound effect a retroflexion often exerts upon the entire organism of the patient. These general symptoms, for

the most part, are of a nervous nature and consist, in the main, of persistent headache, both on top and in the back of the head, palpitations of the heart, dyspepsia, a general lassitude, heavy but not refreshing sleep, or, on the contrary, an easily disturbed slumber, and a great irritability and psychic depression.

Formerly, these multitudinous symptoms were simply called "reflexes" and this explanation satisfied both patients and physicians, though neither had a clear conception of the exact meaning of the well-sounding term. Certain writers did, indeed, endeavor to establish the devious routes over which impulses from the genital organs travel to other organs by way of the sympathetic nervous system and thence by anastomosing fibers to the central nervous system.

To-day such explanations have been largely abandoned as being too artificial and improbable. In their stead, the teaching of the neuropathic constitution has been almost universally accepted. According to this newer conception, there is, in many women, an inherent weakness of the nervous system which is ill prepared to withstand the wear and tear of modern life. But little is needed to turn the scales and to establish in such predisposed individuals a condition which is characterized by a multitude of complaints without any anatomical basis. The essence of these neurasthenic manifestations is their subjectivity and the ease with which they can be called forth by irrelevant causes or, conversely, controlled, temporarily at least, by suggestion. In such women, so say the most recent writers on the subject, the symptoms of retroflexion analyzed above are in reality merely neurasthenic manifestations, while the displacement itself is only an accidental finding which has no causative relation to the host of local or general complaints. If further proof were needed, to continue the argument, the behavior of women with strong, non-neurasthenic constitutions need only be cited who may have a retroflexion without ever noticing any ill effect. The logical conclusion, then, is to leave the displacement untreated and to concentrate one's medical attention on the treatment of the neurasthenia.

It is impractical to go deeper into the subject beyond saying that to me this attitude appears but a passing fashion, a swinging of the pendulum back from the other extreme, the operative furor with which *every* retroflexion was at one time attacked. The truth, to my mind, lies in the middle. No doubt, the general symptoms are of a neurasthenic nature and may occur even though there is no retroflexion or any other genital affection. I will further admit that, in some few women, an otherwise uncomplicated acquired retroflexion may exist for many years without causing great inconvenience. There are racial as well as individual differences of reaction to discomfort, but I believe that sooner or later every such profound disturbance in the architecture of the pelvis as a retroflexion must cause symptoms. By chance, I have observed within the most recent past a whole epidemic, so to speak, of alarming preclimacteric menorrhagias in women who professed to have had no other symptoms from their retroflexions of long standing; yet, when questioned very closely this or that patient would admit that she has had backache for years, or frequent urination, or other slight discomfort which they considered perfectly natural and, therefore, not worth mentioning.

The *diagnosis* of retroflexion is made by bimanual examination. The cervix is found unusually low, that is, nearer the vaginal outlet than normally and pointing in the axis of the vagina or even towards the symphysis. The upper portion of the cervix, on its posterior surface, seems to be unusually long. The two hands palpating toward one another fail to detect the uterine body in its normal place. The front part of the pelvic cavity is empty so that the two hands will meet, while in the sacral hollow, usually a little to the left or right, the uterine body with its characteristic contour can be mapped out in direct connection with the cervix.

Recto-abdominal palpation is of invaluable advantage and should be frequently resorted to, particularly in virginal patients. The speculum examination is of no value in determining a retroflexion, but it must not be omitted because it will show the condition of the cervix.

The examination with the uterine sound is still widely employed for the diagnosis of retroflexion. I mention it merely to condemn it. It carries with it only dangers. It supplies no information that cannot be obtained better and more fully by bimanual palpation.

Not every resistance behind the cervix need be the uterine body. Only if the cervix can be plainly felt in continuity with the mass in the culdesac is our diagnosis established. In all other cases we should consider the possibility of a retro-uterine tumor which forces the uterus forward, is separate from the latter, and differs from it in size, form, and consistence. Such tumors may be fibroids or ovarian cysts, or an old exudate, or, most carefully to be excluded, a tubal pregnancy or hematocele. Again, a mistake is possible in cases of an elongated cervix pointing forward with a small uterine body lying in extreme anteflexion (page 47). If there is the slightest doubt left, or if the uterus is too small and the abdominal walls too thick, an examination under anesthesia is clearly indicated.

THERAPY

If it is true that between 75 and 90 per cent of all acquired retroflexions occur in the puerperium, it is obvious that our prophylaxis must begin in this stage. As a matter of fact, it should begin even earlier, that is, in labor, where it is synonymous with good obstetrics in general. Scrupulous attention to asepsis and antisepsis, strict indications for forceps, careful repair of all birth injuries, will do much to reduce the chances of future displacements. Still more promising are prophylactic measures in the puerperium when the laxness of the pelvic floor and the abdominal muscles, together with the weight of the involuting uterus, greatly facilitate a retroflexion. Invigorating exercises are here in order. Instead of letting the patient lie inactively on her back, make her move freely in bed, almost from the beginning. Have her raise her head and shoulders from the bed without the help of her arms, and likewise her legs, and demonstrate to her how the abdominal muscles will contract and the diastasis of the recti muscles disappear. Then let her raise her

hips and contract her rectum (page 42) to strengthen the levator ani. There are a good many other calisthenic movements, but these are the most important ones for our purposes. The necessary details are given in the chapter on medical gymnastics. They will help the patient over the boredom of the ten or twelve days she is to stay in bed, and, *if persisted in regularly*, two or more times daily and in steadily increasing numbers, her muscular supports will be almost as strong as before confinement. To this must be added the knee-chest position, to be assumed three times daily, for a few minutes each time (Fig. 22).

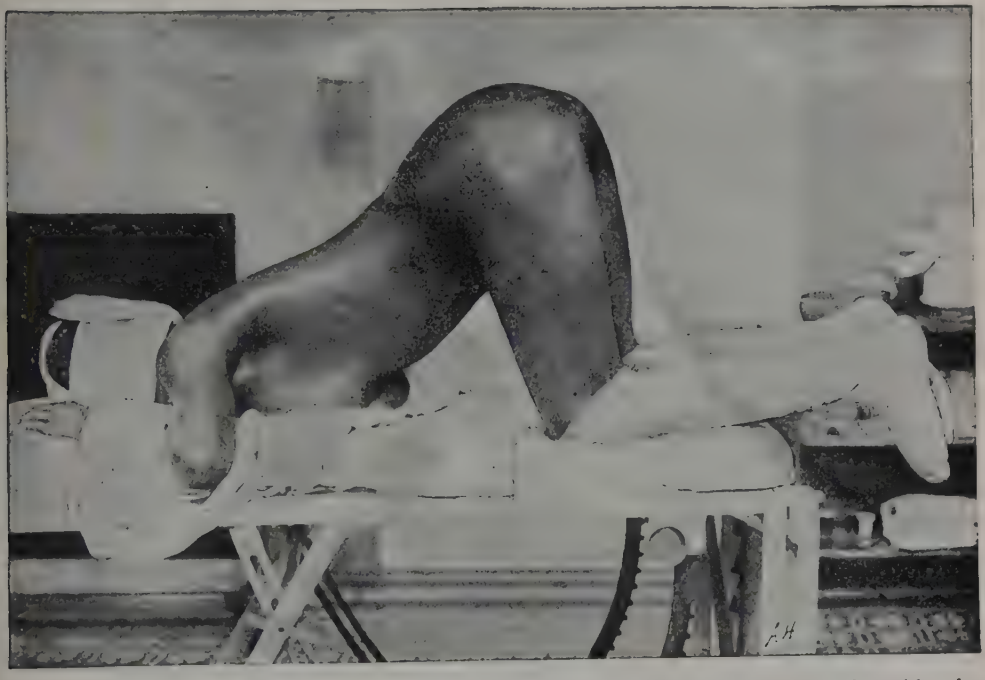


FIG. 22.—THE KNEE-CHEST POSITION. Note the approximation of the chest to the table, the spreading out of the elbows, and the direction of the face to one side, as well as the curving-in of the back. The patient should be at rest and feel well supported in this posture (from Kelly, *Medical Gynecology*).

Beck recommends his "kangaroo walk" as a preventive of retroflexion (Fig. 23). The kangaroo walk consists in walking on all fours with the palms of the hands on the floor and the knees held as stiffly as possible. The exercise is taken in the morning and at night when the clothing consists only of a nightgown and slippers. It is begun on the ninth day after delivery when the patients are allowed out of bed for the first time. Frequently they are able to cover only a few yards. On each succeeding day the distance is progressively increased until, at the time of discharge, they continue it for five minutes in the morning and five minutes at night. If the patients faithfully carried out this exercise after their discharge from the hospital, Beck found that involution was stimulated and that retrodisplacement occurred in less than 10 per cent of the cases reëxamined.

Every patient should be examined four weeks after confinement, and a pessary should be inserted, if the uterus lies backwards. Even if the uterus is found in normal position, a second examination should be made two weeks later when the involution of the uterus is normally complete. Many a uterus, in normal position in the fourth week, will be found retroflexed two weeks later. All exercises should be kept up for a month or two longer. They make assurance doubly sure, and in every case the patient's physical and mental status will be all the better.

While it is not claimed that absolutely every retroflexion can thus be prevented, it is safe to say that, by observing these prophylactic hints, many thousands of women can be spared the sequelae of a backward displacement.

FIG. 23.—BECK'S "KANGAROO WALK" (courtesy of Dr. A. C. Beck).

Conservative Treatment.—In an already established retroflexion, we must first decide whether we have to deal with a movable or a fixed retroflexion.

To decide the question, we must try to replace the uterus. For this purpose, we have six different procedures at our disposal.

BIMANUAL REDUCTION.—Bladder and rectum must be empty. Two fingers within the vagina lift the fundus out of the culdesac by pressure from the posterior fornix (Figs. 24, 25, 26 and 27). The outer hand receives the fundus at the promontory and guides it into anteflexion while the inner fingers push the cervix backward. In some cases recto-abdominal palpation is preferable. By putting the patient in the Trendelenburg position, painful pressure upon the intestines is avoided and the procedure is rendered less difficult.

In many cases, however, bimanual reduction fails because it is too painful, so that the abdominal muscles do not relax.

Knee-Chest Position.—The patient assumes the knee-chest position on the examining table. The labia are spread apart with two fingers long enough for the air to enter into, and distend, the vagina. A few deep breaths of the patient still further assist the atmospheric pressure on the uterine body which is thus slowly forced out of the sacral hollow. If, now, the patient is quickly turned into the dorsal position, a bimanual examination

Fig. 24.—Bimanual Replacement of the Retroflexed Uterus. First step.

will, under favorable circumstances, find the fundus in front of the promontory and accessible to complete correction of the misplacement.

Kuestner's Procedure.—With the patient in Trendelenburg position, a strong but slow and steady pull on a tenaculum in the anterior lip brings the cervix downward close to the vaginal entrance (Fig. 28). The axis of the uterus is thereby straightened and a retroversion made out of the retroflexion (Fig. 29). The handle of the tenaculum is now raised toward the symphysis and the instrument from this position pushed back into the vagina (Fig. 30). Thereby, the uterus is luxated past the promontory, when the outer hand can receive the fundus and lead it forward, while, after having removed the tenaculum, the inner fingers push the cervix backward. Sometimes a finger in the rectum will aid in the luxation of the uterus.

This procedure usually succeeds where the preceding ones have failed. If gently executed, it causes very little pain. I am in the habit of announcing that the application may hurt a little; the patient, thus forewarned, is generally agreeably disappointed.

Reposition with the Uterine Sound.—This procedure has lost its former popularity. It is to be condemned, unreservedly, because of its many dangers (unsuspected pregnancy, gonorrhea, perforation, pain).

The Colpeurynter.—In cases of retroflexion of the pregnant uterus, none of the foregoing procedures is applicable. In such an emergency re-

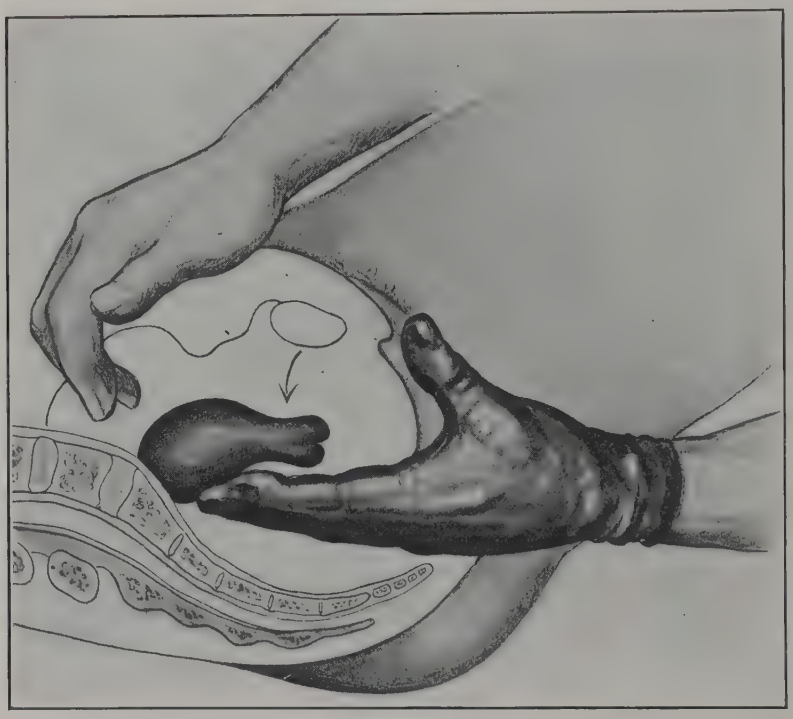


Fig. 25.—Bimanual Replacement of the Retroflexed Uterus. Second step.

position is imperative, because, in many cases, the displaced organ does not right itself and abortion or worse consequences may follow. The most gentle measure of reduction is by means of a mercury colpeurynter; the method of application is fully described in Chapter XIX.

Examination in Narcosis.—Only if all these procedures have been of no avail, a general anesthetic may be given for purposes of reduction.

If we finally determine that the uterus cannot be replaced and thus arrive at the diagnosis of a fixed retroflexion, we must assign the case to operation. Attempts at gradually loosening the adhesions by tampons, etc., or brusquely breaking them in narcosis are not to be recommended.

If, on the other hand, we have established the fact of a movable retroflexion, we have, by our maneuvers of reduction, already accomplished the first step of a rational treatment. The next step must be to hold the uterus

in a forward position by means of a pessary. *The uterus must be in normal position before the pessary is inserted.* Between the reposition and the introduction of a pessary, a very freely movable uterus may, and very often does, fall back into the faulty position, *unless the patient with her own fingers pushed deeply into the abdominal walls behind the uterus prevents, for the time being, a recurrence of the malposition* (Fig. 31).

Pessaries are narrow, round or oval rings of hard rubber, celluloid, aluminum, copper wire covered with rubber, and other substances. A multitude of different forms has been handed down to us from the earliest periods of gynecology, when almost every specialist felt it incumbent upon himself to devise a new model. We might well dispense with most of these antiquated and

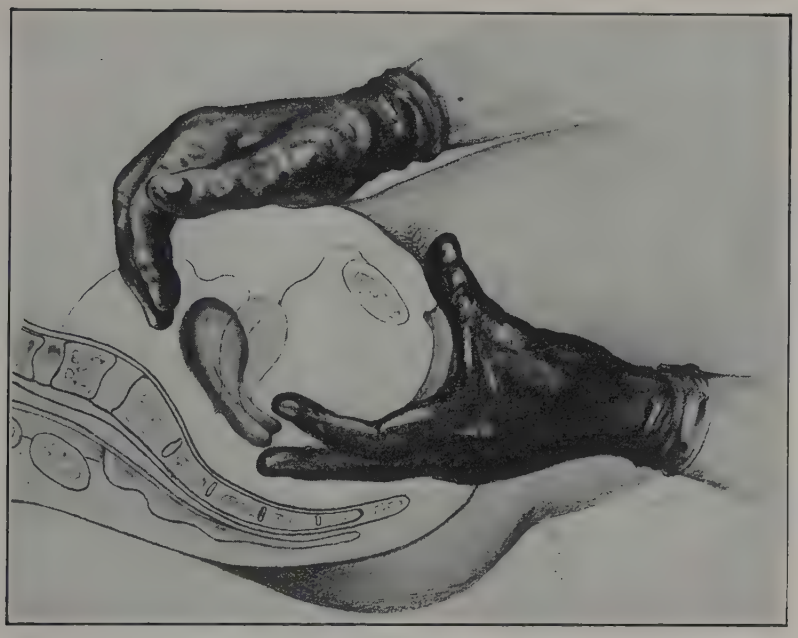


FIG. 26.—BIMANUAL REPLACEMENT OF THE RETROFLEXED UTERUS. Third step.

often grotesque appliances. I find that two or three models, of which various sizes must be kept on hand, will meet all requirements (Fig. 32). They have a broader posterior bar which is bent more or less sharply upward, and a somewhat narrower anterior bar which sometimes is curved slightly downward.

The introduction is as follows: The index finger of the left hand presses the perineum downward, thus enlarging the vaginal entrance. The well lubricated pessary is held at the anterior bar with thumb and index finger of the right hand, and the posterior bar is passed through the vaginal opening in the oblique axis of the vagina, so as to avoid the sensitive urethra (Fig. 33). As the pessary is pushed inward, the fingers of the left hand take hold of the posterior bar, guide it past the cervix and then turn it into the transverse axis so that the posterior bar comes to lie in the posterior fornix,

while the anterior bar touches the anterior vaginal wall behind the vaginal entrance (Fig. 34).

The proper selection and the painless introduction of a pessary is an art which can be acquired only with practice. The pessary should not be so large as to stretch the vaginal walls and it should be possible to pass a finger easily around it; nor should it be so long as to impinge the urethra against the symphysis. Too small a pessary will slip out, if the patient strains. Too large a pessary will cause pain. The right kind should not be felt at all by the patient nor cause any discomfort at coition.

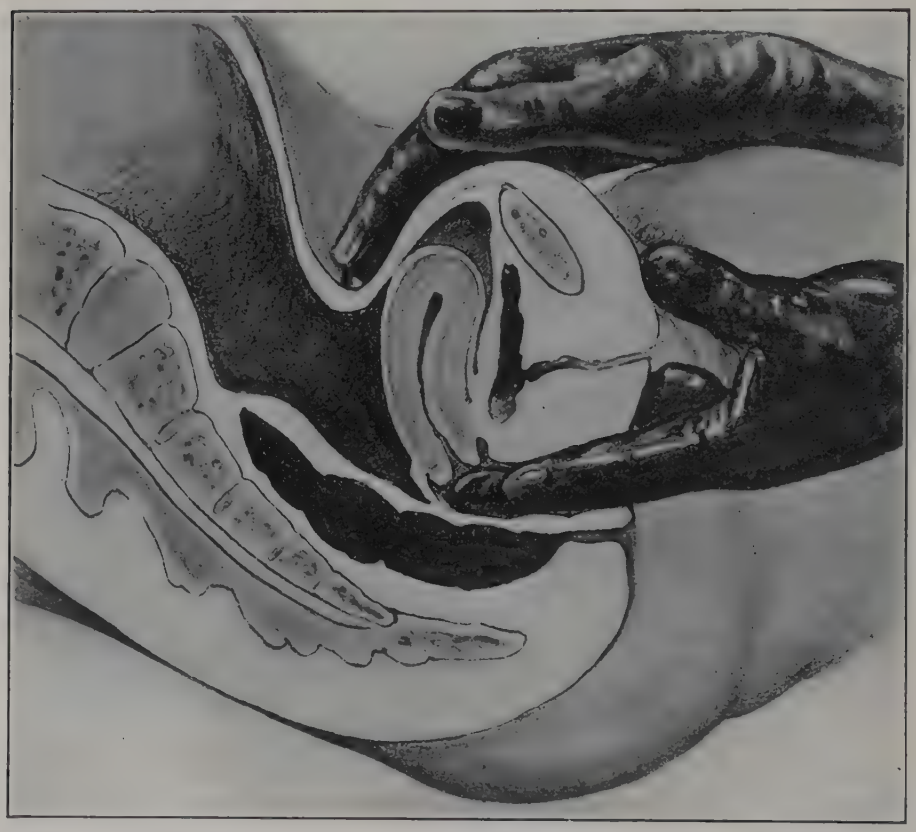


FIG. 27.—BIMANUAL REPLACEMENT OF THE RETROFLEXED UTERUS. Fourth step.

A few days later, reëxamination will show whether or not the pessary fulfills its object of keeping the uterus in anteflexion. A number of pessaries may have to be tried before the right one is found—just as the first shoe tried on in a shoe store may not fit comfortably.

The after-care is simple. The patient takes a cleansing douche, preferably one containing a mucus dissolvent, such as bicarbonate of soda, every day and reports every two or three months for examination. The pessary is removed by a procedure which is exactly the reverse of the introduction, and is cleansed with *cold* water and soap. As the presence of any foreign body causes increased vaginal secretion, a hard rubber pessary is often found

roughened and corroded. For this reason, I prefer pessaries made of hard glass, which remains smooth and can be sterilized by boiling (Fig. 34a). Before reinsertion of the pessary a speculum examination must reveal the

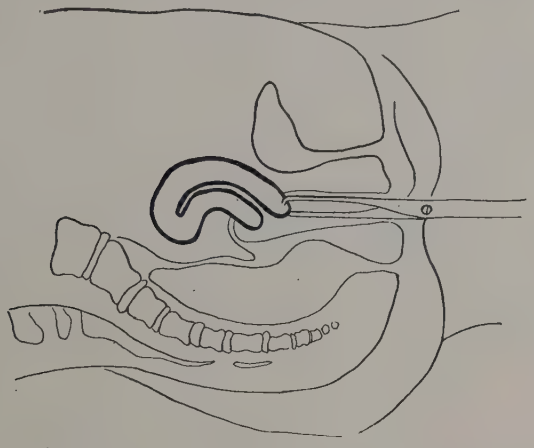


FIG. 28.—KUESTNER'S METHOD OF REPLACING THE RETROFLEXED UTERUS. First step.

absence of any pressure mark or other vaginal irritation. Any such must be treated with 2 to 5 per cent silver solution for a week or two before the pessary may again be applied. That the uterus may have to be brought again into

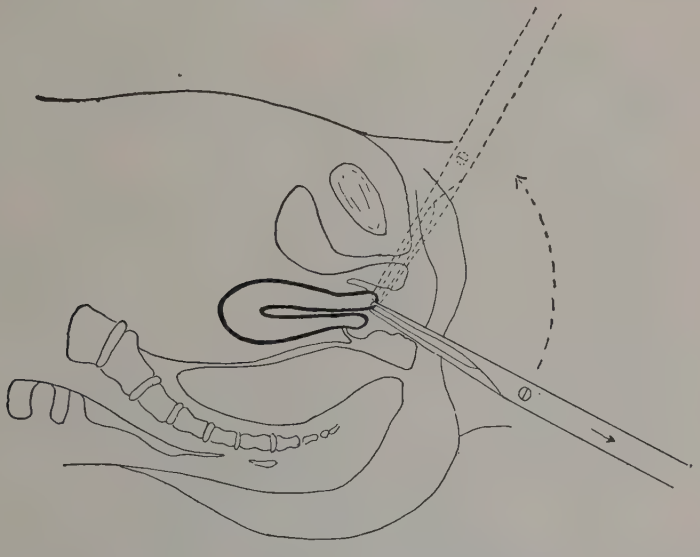


FIG. 29.—KUESTNER'S METHOD OF REPLACING THE RETROFLEXED UTERUS. Second step.

anteflexion is a matter of course, yet a measure which, unfortunately, is often neglected.

In the case of retroflexion of the pregnant uterus, or if conception should occur during the treatment, the pessary is worn until the end of the fourth month, when the size of the uterus will prevent a return of the displacement.

In pregnant women, the pessary has to be taken out and cleansed every four weeks.

Can the pessary ever cure a retroflexion permanently? The advocates

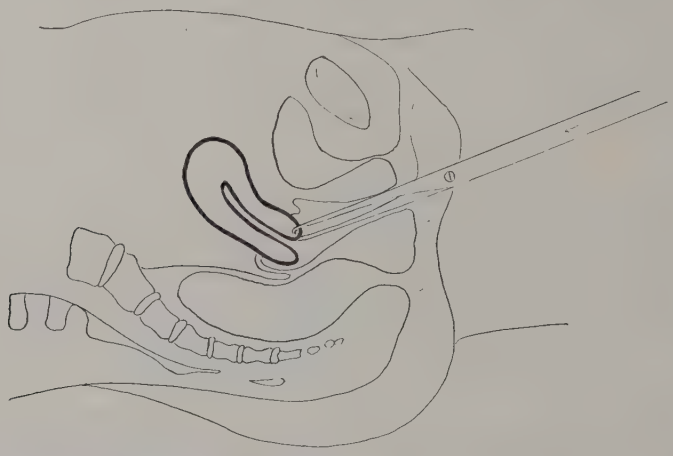


Fig. 30.—Kuestner's Method of Replacing the Retroflexed Uterus. Third step.

of exclusively surgical treatment have almost passionately denied that possibility. True enough, the pessary merely pulls the cervix backward by stretching the posterior fornix so that the fundus tilts forward and is now pushed

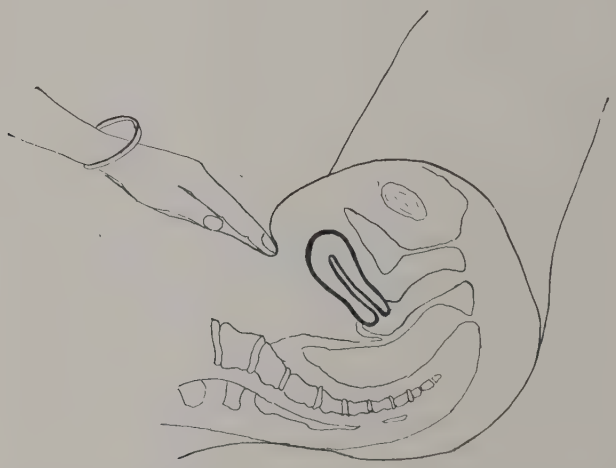


Fig. 31.—After Successful Replacement, the Uterus is Prevented from Slipping Back Until the Pessary is Adjusted.

by the intra-abdominal pressure against the pelvic floor (Fig. 35). But there is much more to the pessary than a mere orthopedic and temporary correction of the faulty position of the uterus. Very often we find an edematous uterus when we first place it in a pessary, but only a few days later the size

of the uterus has become normal. The pelvic floor, unless it has been damaged too extensively, will likewise be benefited by this decongestion and regain a

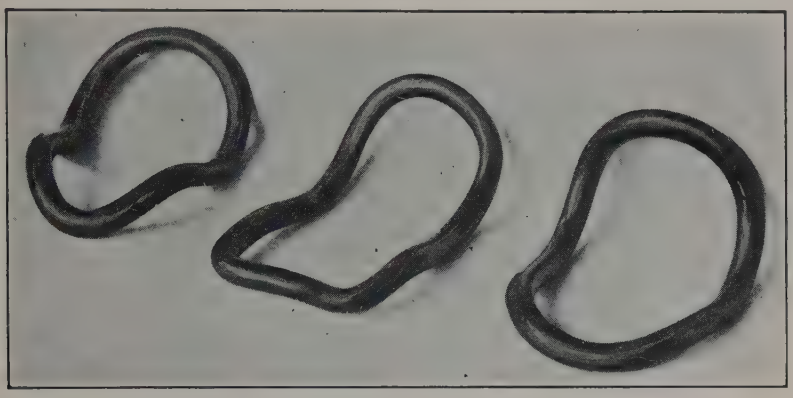


FIG. 32.—SUITABLE TYPES OF PESSARIES.

fair degree of resistance, which must be still further increased by *systematic exercise of the levator ani,* and as a matter of fact I have, like every other

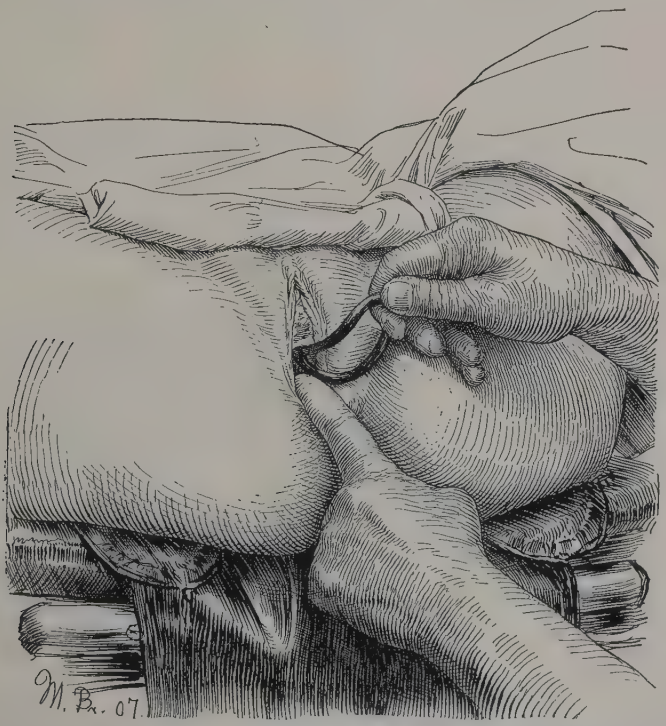


FIG. 33.—SHOWING MANNER OF INTRODUCING A PESSARY. The index finger of the left hand pulls back the vaginal wall, while the right hand introduces the pessary without bruising the structures lying anteriorly (from Kelly, *Medical Gynecology*).

unprejudiced observer, records of permanent cures in many cases. To be sure, it requires perseverance, both on the part of the patient and the physi-

cian; but such assiduity seems well worth while, so long as not every surgical correction is a success, so long as anesthesia is not without mortality, so long as laparotomies are frequently followed by peritoneal adhesions, as long as abdominal incisions are apt to become infected. There are enough cases left where, from the nature of the local conditions or the mental attitude

FIG. 34A.—THE FINGERS OF THE LEFT HAND TAKE HOLD OF THE POSTERIOR BAR, GUIDE IT PAST THE CERVIX, AND THEN TURN IT INTO THE TRANSVERSE AXIS (from Crossen, *Diseases of Women*).

of the patient, a pessary is useless or not tolerated and an operation is preferable, but in most cases a trial, at least, with pessaries is indicated.

A freshly acquired retroflexion may require pessary treatment from six to eight months; in older cases the time limit is considerably longer. In course of time, smaller sizes often do the work. However, if the pelvic

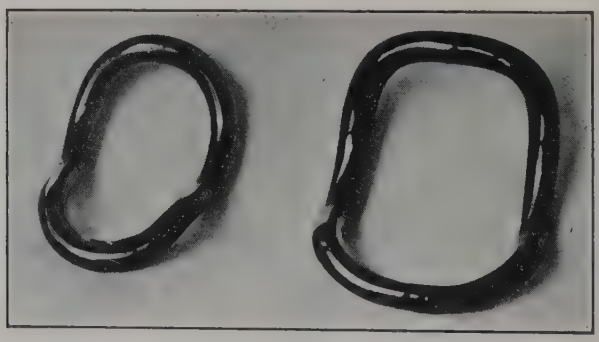


FIG. 34B.—POLISHED GLASS PESSARIES.

floor is so relaxed that only by extreme stretching of the vagina with very large pessaries can the uterus be held in place, it is better to advise operation at once.

The local symptoms of retroflexion are relieved almost instantaneously by a well-fitting pessary. The *general* symptoms, as a rule, persist, *because they are the expression of a constitution which is inferior either from birth*

or inheritance, or weakened by unfavorable outer influences—not the least of which is the very constancy of the distress from the retroflexion.

The vicious circle has been broken by the correction of the displacement. It now is essential to attend to the patient's general condition, to regulate her mode of life, to insist on exercise in fresh air, to employ hydrotherapy and psychotherapy along the lines elsewhere laid down. It is an effort well worth while, for when it has been accomplished, the patient returns to her occupation, whatever it is, with new vigor and new hope. It is deplorable that we, as physicians, cannot entirely remove the burden of modern life with its complex physical and psychical problems, but we can do a great deal to ease it, and the repeated visits of the patient give us fresh opportunities in that direction.

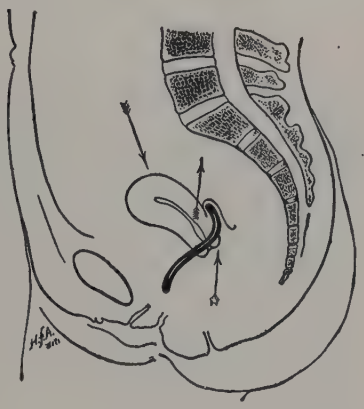


FIG. 35.—DIAGRAM ILLUSTRATING MECHANICS OF PESSARY. The posterior vaginal wall stretched over the upper transverse bar of the pessary pulls the cervix upward and backward, thus throwing the fundus forward. The pessary imitates the action of the uterosacral ligaments (from Anspach, *Gynecology*).

Prolapse.—As long as the levator ani is strong and the hiatus genitalis (page 43) narrow enough, the retrodisplaced uterus, though slightly lower than normal, will remain above the pelvic floor. But, if the pubic cleft is widened from birth-injuries to the muscle, there is nothing to prevent the uterus from slipping through the hiatus genitalis. The intra-uterine pressure bearing upon its anterior surface will, little by little, force the uterus downward, first to the vaginal entrance, then into the vulva, and, finally, entirely outside the body. The uterus in its descent will drag the anterior vaginal wall with it, and the bladder will follow all the easier because its own support, the urogenital diaphragm is, as a rule, also more or less damaged. The posterior vaginal wall, and with it the ampulla of the rectum, likewise yield to the continued pull from below, augmented by the pressure from above, and gradually the entire vagina is thus inverted. The tubes and ovaries necessarily follow the uterus downward and, finally, coils of intestines drop into the funnel-shaped space created by the descent of the uterus.

For a while, the uterine ligaments oppose a feeble resistance to being put on a stretch, and the patient becomes conscious of this pull by a sensation of dragging and bearing down and backache; and at night they might even draw the uterus back into the pelvic cavity. But eventually their limit of elasticity is reached and the relaxation becomes permanent. The prolapse is now complete—a grayish-white tumor of the size of a man's fist or larger that protrudes from the pubic arch (Fig. 36). The vaginal mucosa soon loses its physiologic moisture and becomes dry, leathery, epidermislike. The cervix and vagina exposed to friction and infection may exhibit one or more shallow ulcers with irregular contours which bleed very little and, strange to say, hardly ever become carcinomatous. The whole tumor represents a hernia: the vagina is the sac; bladder, rectum, uterus and adnexa, and intestines

form the contents; and the weakened and damaged levator cleft is the neck. The extreme dislocation of bladder and rectum explains readily the symptoms arising from these organs. Many women can void only by pushing the hernia inward. The uterus causes practically no symptoms because the condition usually occurs in the postclimacteric age, but the size of the tumor interferes with walking. The diagnosis is obvious both by inspection and

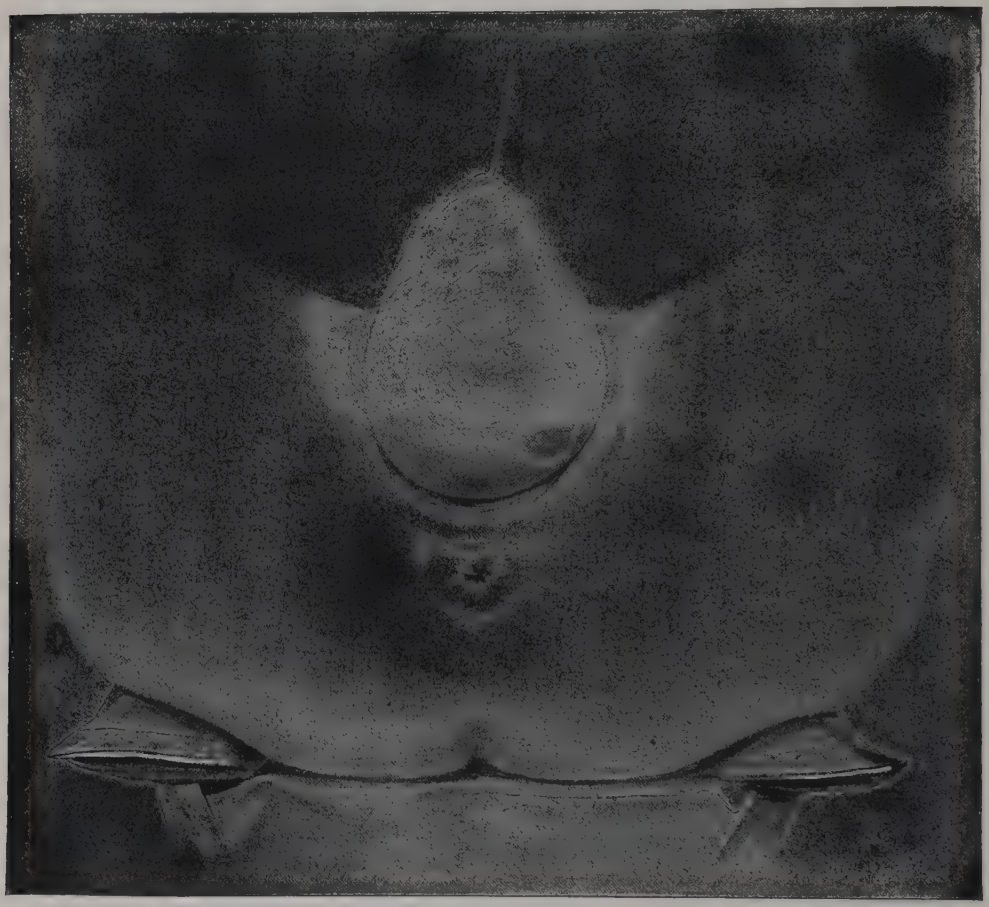


FIG. 36.—COMPLETE PROLAPSE OF UTERUS AND VAGINA. The grayish-white tumor exhibits several ulcerations (from Kelly, *Operative Gynecology*).

palpation; and mistaken differentiation from protruding submucous fibroids, large cervical polypi, vaginal cysts or inversion of the uterus (see page 72) can occur only to the careless observer.

When the urogenital diaphragm alone has been damaged, a possibility to which Hirst recently has called renewed attention, the bladder alone may protrude (cystocele), particularly, if the perineal body has been damaged at the same time. Strictly speaking, this is not a prolapse as the uterus may remain in perfectly normal position. Yet it is mentioned here because both conditions require the same treatment.

For the sake of completeness, finally, uterine prolapse, due to congenital weakness or aplasia of the levators, should be mentioned. This has been found in the newborn, combined with spina bifida and other developmental anomalies. In older children or nulliparous women it is invariably associated with signs of general infantilism, spina bifida occulta, etc. A case of this sort, observed by me in a girl of thirteen, has been described by Pollock.

TREATMENT.—*Prophylactic.*—Preventive treatment of prolapse is identical with that of retroflexion (page 56). But the subject is so important that the fact that the practitioner should avoid anything that might lead to a widening of the levator cleft cannot be too strongly emphasized. Any rapid delivery of the head through an unprepared pelvic floor, whether by forceps or in breech presentation, is bound to tear the pubic bundles of the levator. Let a high forceps be an anathema! A mid forceps should be employed but sparingly and even in a low forceps the rotation of the head with the instrument is apt to cause levator tears. For this reason, rotation should be attempted by external manipulations, that is, by pushing the back towards the other side.

Of course, not all cases of injury to the levators can be avoided. In any event, *anatomically correct repair should be the aim,* not merely the outside adaptation of the wound edges by a few through-and-through sutures. Systematic exercises in the puerperium, particularly of the muscles of the pelvic floor, are of essential value.

Orthopedic.—Once established, a prolapse can be cured only by surgery. If an operation is contra-indicated by the general condition or advanced age, or steadfastly refused by the patient, pessaries must be resorted to as a makeshift. The kind of pessaries, however, that are so useful in retroflexion, are here of no avail. They will slip out of the vagina almost immediately. The principle in prolapse is to insert a support which stays in place by stretching the vagina *ad maximum.* The obvious drawback is, that the existing relaxation is intensified by our very treatment.

The treatment must be preceded by reposition. Occasionally, the congested tumor is too large to be pushed back, and rest in bed and hot fomentations for a day or two are needed to bring about a depletion. Ulcerations heal quickly when touched with a 10 per cent silver nitrate solution. The reinverted vagina rapidly returns to normal conditions.

Among the pessaries used in prolapse, the soft rubber rings enjoy an undeserved popularity. The inexpensive kind, made of gray rubber, contains a great deal of sulphur and transforms the vagina quickly into a pool of pus. Even the black rings, made of pure rubber, irritate the vaginal walls in a very short time. Thick ring pessaries (Fig. 37), shell pessaries (Fig. 38) or disk pessaries (Fig. 39) made of hard rubber are far better, though these, too, lose their smooth polish and cause irritation. They are well lubricated and introduced edgewise and a little obliquely so as to avoid the urethra, while the perineum is strongly pushed downward. Extreme care must be observed in very old women, lest the tissues, which are without any elasticity, tear and give rise to bleeding and pain. All these pessaries have this drawback: they turn from their original transverse position into the

axis of the vagina and are then expelled. The Menge pessary overcomes this difficulty (Fig. 40). It consists of a thick, hard rubber ring with a detachable stem which prevents the turning of the support. It is not necessary and is needlessly difficult, first to introduce the ring, as the textbooks advise, and then to fit the stem within the vagina. I always insert the *entire* appliance

Fig. 37.

Fig. 38.

Fig. 39.

Fig. 37.—Hard Rubber Ring Pessary Used in Prolapse (Kny-Scheerer).
Fig. 38.—Shell Pessary (Kny-Scheerer).
Fig. 39.—Disk Pessary (Kny-Scheerer).

with a corkscrewlike motion and select the smallest of the three sizes which will stay in place. The one great disadvantage is the fact that the cervix, resting within, or sucked into, the circumference of the annular part, easily becomes irritated (Fig. 41). For this reason I prefer the Loehlein pessary with its cuplike surface and nondetachable handle (Fig. 42).

Fig. 40.—Menge's Prolapse Pessary.

Constant control of pessaries in prolapse is essential. The patient has to take daily douches with bicarbonate of soda, one tablespoonful in a quart of warm water, liquor of aluminum acetate, a tablespoonful in the same amount, peroxid of hydrogen, diluted with five times the quantity of water, or the like. Kelly mixes two grains of menthol in two teaspoonfuls each of bicarbonate of soda and borax and dissolves it in a quart of water. Every four weeks the physician removes and cleanses the ring and inspects the vagina for pressure marks, abrasions, or ulcerations. If such are present, the ring is left out temporarily, until the irritated parts have healed under cauterization or douches. A tampon, thickly covered with a silver nitrate salve and applied daily by the patient, brings speedy relief.

℞ Argenti nitras..... 2.4 (grs. 35)
Adeps. Lan. Hyd. (Lanolin)
Vasel. alb.....āā 60.0 (āā ℥ 2)

Unfortunately the result is often only transitory, because the reinserted pessary quickly irritates the vagina anew.

The Menge or Loehlein pessary will keep almost every prolapse replaced. There are, however, cases of such enormous extent that no pessary (and no operation) would give relief. We are then forced to resort to the old-fashioned cup and stem pessary. The McIntosh model, which I sometimes find in patients from the country, is very unsatisfactory to my mind. The Napier pessary which is used in England seems to be somewhat better (Fig. 43). According to Eden, it "consists of a thick, but flexible, stem terminating

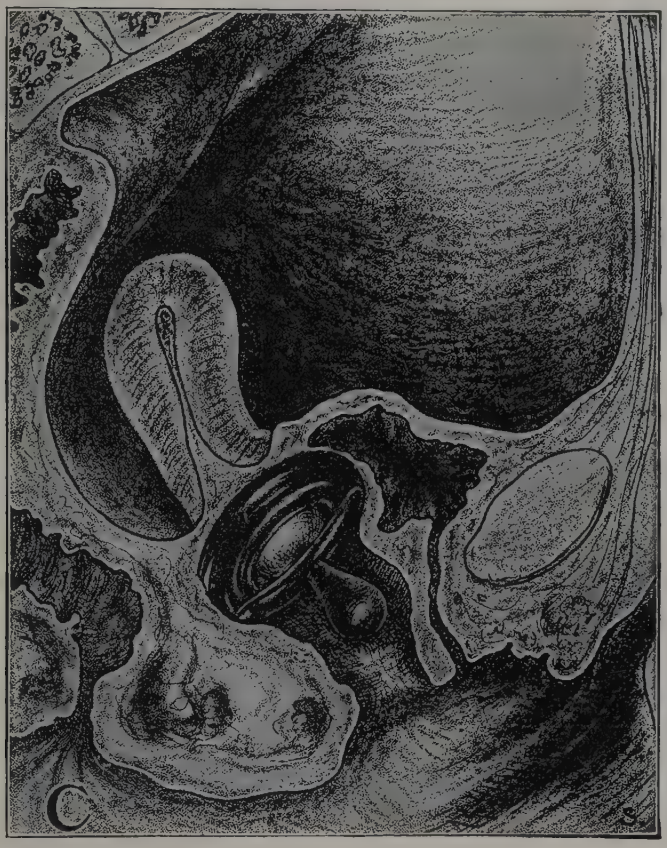


FIG. 41.—THE MENGE PESSARY IN PLACE. The stem lies in the vaginal canal and keeps the ring from turning into any position that will allow it to slip out (from Crossen, *Diseases of Women*).

above in a shallow rubber cup; when introduced, the cervix rests upon the cup, which is perforated to allow the escape of discharges. The stem is of sufficient length to allow the lower end to lie outside the vulva. Through this end are threaded two rubber bands, and to each end of the bands tapes are attached. The tapes are passed, two forward over the pubes and two backward over the buttocks, to be fixed to a belt round the waist. By adjusting the tension of the tapes, elastic pressure in an upward direction is exerted upon the instrument through the rubber bands, and in this way the descent of the uterus or the vaginal walls is prevented. This instrument should be worn only during the day; after removal each night a vaginal douche

should be used; before reintroducing it the instrument should be thoroughly cleansed by boiling, or immersed in a 5 per cent carbolic acid solution. The continued use of this pessary cannot be advised unless these precautions are taken, but its management is readily learned by the patient herself or an attendant. Neglect of these precautions may lead to serious ulceration of

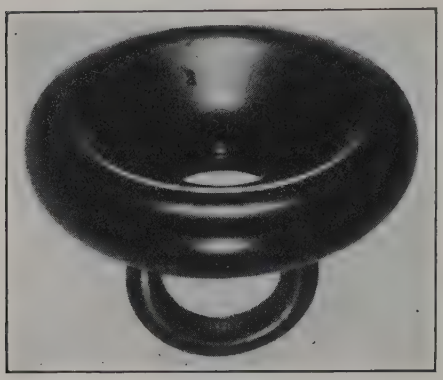


FIG. 42.

FIG. 43.

FIG. 42.—LOEHLEIN'S PROLAPSE PESSARY.
FIG. 43.—NAPIER'S PESSARY FOR PROLAPSE (from Eden and Lockyer, *Gynecology*).

the vagina; and inasmuch as the precautions cannot be enforced, cases in which it is recommended must be carefully selected."

"A few old ladies say," so states Fothergill, "that they can keep themselves comfortable with these devices; but, as a rule, it is more satisfactory to wear a good perineal pad supported by a T-bandage. The action of the pad is improved if the patient packs some lint or gauze into the vagina every morning before putting on her pad and bandage." Occasionally, a hard rubber ball (Fig. 44) may be inserted by the patient during the day.

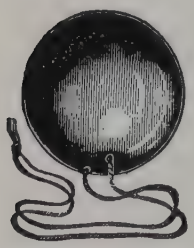


FIG. 44.—GLOBE PESSARY OF HARD RUBBER (Kny-Scheerer).

In these truly incurable cases there is, then, a field for the ingenuity of the attending physician in relieving, somewhat, the deplorable lot of his patients.

Inversion.—Inversion, that is, a turning inside out of the uterus, is a rare obstetrical complication. It occurs in labor either spontaneously from excessive flabbiness of the uterine muscle, or violently, due to pull on the umbilical cord or to incorrect execution of expression of the placenta. From 23 per cent (Zangemeister) to 35 per cent (Jones) of these acute cases die from shock and hemorrhage and a good many others from infection later on. In those that survive untreated, that is, the *chronic* variety that alone concerns us here, the condition may remain undiscovered for from several months to many years. Menorrhagia or metrorrhagia, or both, lead to an examination; there is, of course, much purulent discharge from the exposed mucosa, and considerable dragging sensation from the taut ligaments, and some mechanical interference with bladder and rectum.

On examination, a red, bleeding, pear-shaped tumor is found, filling the vagina more or less completely, and, at its lower pole, the openings of the fallopian tubes may be seen. The cervix is felt, high up around the neck of the tumor, as a rigid ring through which a sound may be introduced for a short distance. In complete inversion, only a slight thickening may indicate the site of the cervix. The hand palpating from above fails to find the uterine body at its normal place; instead, there is a funnel-shaped depression. The determination of this depression will guard against mistaking the tumor for a pedunculated fibroid or a cancer of the cervix, in both of which the uterine body would be found behind the symphysis. If in doubt, examine the patient in narcosis.

TREATMENT.—Reposition, or taxis, is the logical method of treatment. This must be preceded by some preparatory measures. The patient should be kept in bed with the foot of the bed raised, the bowels and bladder regulated, and the surface of the inverted uterus cleansed as far as possible by douching with an antiseptic solution of a non-poisonous character (liq. aluminum acetate). Edema and swelling can be reduced by the use of boroglyceride or ichthyol-glycerine tampons, and the general condition should be improved as much as possible. Hemorrhage must be treated energetically with adrenalin solution or antipyrin-salol (page 200).

After a few days of such treatment, reposition is attempted under complete surgical anesthesia with the patient's hips raised. Volsella are placed in the cervix, both anteriorly and posteriorly, and a steady traction exerted by an assistant. For reinversion, the fundus is first indented, or one horn is first pushed inward as a beginning. Better still is the method suggested by Emmet (Fig. 45). Here the pressure is made on that part of the inverted fundus which came down last, that is, the part which is in immediate propinquity to the constricting ring of the cervix. The fingers encircling the fundus reduce the swelling of the organ to a certain extent by the necessary manipulations and squeezing. They are passed through the cervix and pressed on the portion of the uterus just above the cervix which has not yet descended, at the same time stretching open the constricting ring. Under favorable conditions this will shortly be felt to yield, and the inverted portion to pass slowly upward, and presently, as the pressure is maintained and the cervix stretched open by the fingers, the whole fundus will pass through it and undergo reposition. A return of the inversion is prevented by packing the uterine cavity with iodoform gauze for a day or two.

Manual reduction should be conducted as gently as possible, because the pathologically altered tissues are apt to tear and, for this reason, should not be continued too long at a time. In any case, a rapid pulse, a rise in temperature and other constitutional symptoms are certain to follow. If, then, the first attempt at reinversion has failed, it is best to wait several days before trying the method again.

The older the inversion, the less likely is manual taxis to succeed, and we may have to resort to mechanical reduction. The simplest method is by colpeurysis. A sterilized rubber bag of Braun is inserted into the vagina (the foot end of the bed must be raised) and distended to capacity with

water or mercury; it is left in place from six to eight hours. During this time the temperature has been taken repeatedly, and if absorption of decomposed tissues evidences itself by fever, the bag must be removed for a few hours and the vagina cleansed. The pressure of the appliance softens the tissues and forces the fundus upward. In some cases, a spontaneous

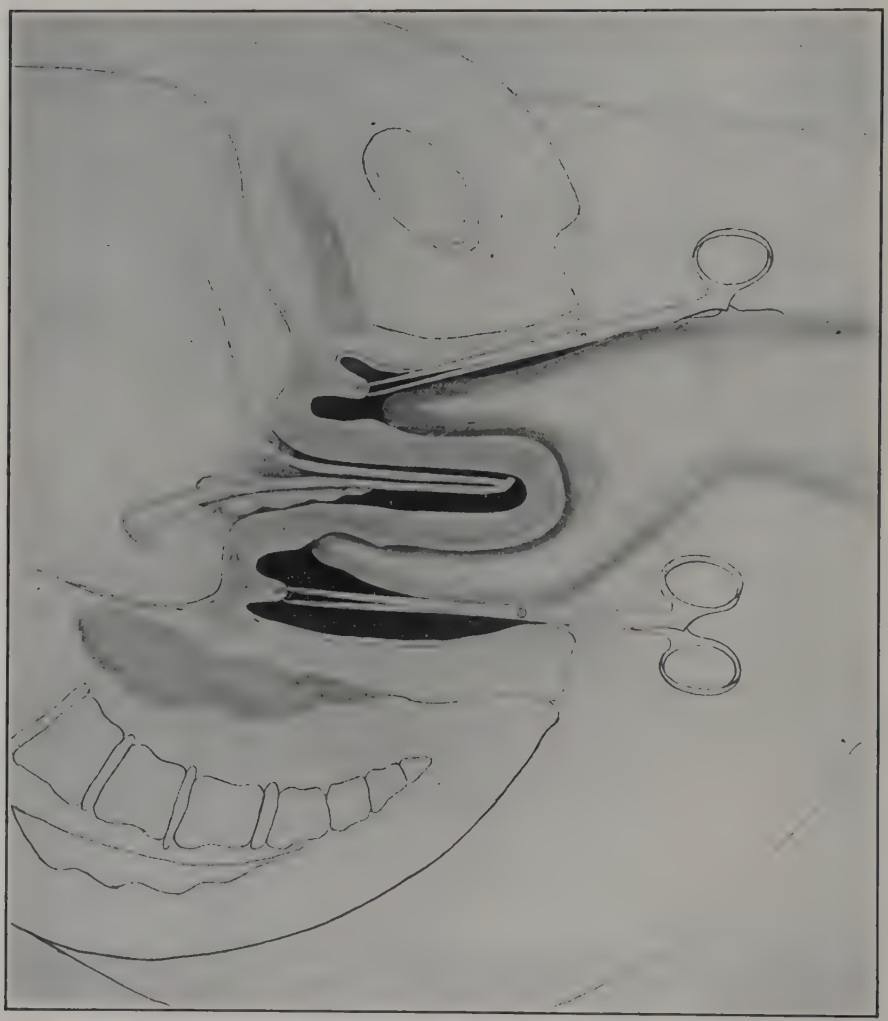


FIG. 45.—EMMET'S METHOD OF REPOSITION OF UTERINE INVERSION.

reinversion may follow, in others, a manual reduction may lead to success. (For details of colpeurysis, see Chapter XIX.)

Another method of applying continuous elastic pressure is by the *repositor* of Aveling (Fig. 46). "The vulcanite cup (*a*) fits over the fundus of the uterus; the cup is continued below into a rigid stem (*b*) to which four strong rubber bands are attached; these are in turn fixed by tapes to an abdominal girdle with shoulder straps (*c*); the cup is thus held in contact with the fundus, and, the rubber bands being stretched, continuous elastic

pressure in an upward direction is applied through the stem to the inverted uterus. Considerable pain attends the use of the repositor. The process of replacement must be carefully watched, and the cup may be removed before reduction is quite completed, for the last part of the process will occur spontaneously. If this precaution is not adopted, the cup may be carried inside the replaced uterus, and great difficulty may be encountered in extracting it through the narrow cervix." (Eden and Lockyear.)

If the first application of the repositor should fail, an interval of some days should be allowed, during which an endeavor may be made to improve the local conditions by the preparatory measure mentioned above. A second attempt may then succeed. Not long ago, Brandão reported the cure of a chronic inversion of two and one quarter years' standing by means of an elastic repositor of similar construction.

Though the technic of these conservative procedures has been presented in detail, the practitioner should not lose sight of the fact that a number of operative methods exist which will speedily cure inversion. If the measures described above are intelligently and dextrously carried out and the only reward is failure, he should not hesitate to refer the case to a competent gynecologist for operation. Surgery is, likewise, indicated in all cases of nonpuerperal inversion where an intra-uterine tumor which has been expelled into the vagina, has pulled the fundus after it.

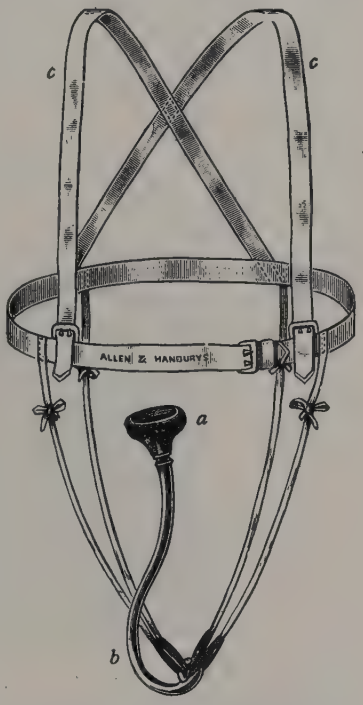


FIG. 46.—AVELING'S REPOSITOR IN UTERINE INVERSION (from Eden and Lockyer, *Gynecology*).

VARICOCELE

The more or less permanent dilatation of the ovarian veins is termed pelvic varicocele. These veins, about twenty in number, arise at the hilum of the ovary and form, within the leaves of the broad ligament, a network of vessels which freely anastomose with one another and with the venous plexus coming from the uterus; they also receive blood from the fallopian tube and the round ligament. They finally converge into two main channels which leave the broad ligament with the ovarian artery.

The totality of these veins is called the plexus pampiniformis, and its varicosities are included in this chapter because they are caused, in the main, by mechanical impairment of the circulation (Fig. 47). They are frequently found in the presence of fibroids or ovarian cysts, in retroflexion, after pregnancy or where there is a general lack of tone and vigor or a passive

congestion of cardiovascular disease. Varicocele may also be caused by an infectious process, either within the veins themselves (phlebitis) or in the surrounding structures, and, finally, we speak of the "idiopathic" variety, a term which merely signifies our lack of accurate knowledge of the etiology.

If one considers that the blood supply of the female reproductive organs has physiologic variations which are not paralleled in any other structures in the male or female, and that any of the variations may become pathological by excess, it is not surprising that varicosities may develop within the pelvis. It is only surprising that so little thought has been given to the subject by the profession.

The patient complains of a more or less continuous dull, aching pain, generally on the left side, often on both, sometimes on the right only. Aggravated just before each period, this dragging or bearing-down sensation is often markedly relieved by the menstrual flow. It is always worse after

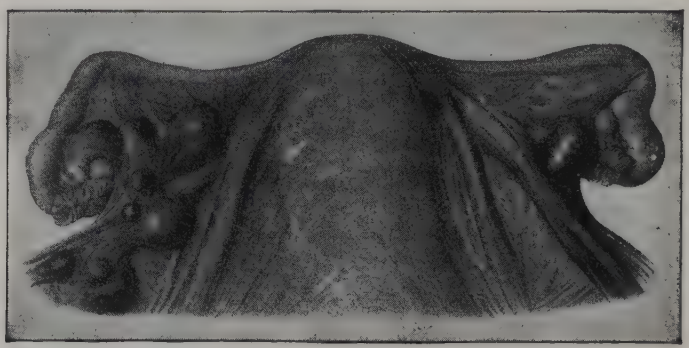


FIG. 47.—THROMBOSED VEINS OF THE BROAD LIGAMENT (from Crossen after Schaeffer, *Hand Atlas of Gynecology*).

long standing or overwork and is relieved by rest and lying down. In working women it is noticeably better the day of the week following the non-working day. The relief of pain after proper vaginal tamponade inserted for diagnostic purposes and its recurrence almost immediately after the removal of the packing is also highly suggestive of varicocele. In some cases there is leukorrhea and in a few a prolongation of the menstruation (Furniss). Now, if such a patient has varicose veins in her legs and, perhaps, also piles, no one can avoid the conclusion that she has varicose veins inside her pelvis as well and that these ache like a man's varicocele. If the woman has no visible varicose veins to lead up to the diagnosis of varicocele, she is said to have "ovaritis" and is blistered and douched or ovariotomized accordingly, without relief. Fothergill, who has been extensively quoted in the foregoing, very aptly remarks that, when a man has aching veins in his scrotum, he is not said to have orchitis, and it is equally wrong to say that a woman has an inflamed ovary when she has only aching veins in her pelvis. Still worse is it to mark such a patient a neurotic or hysteric and to overlook the fact that the persistence of this nagging ache may make even a normal woman nervous and will certainly intensify any existing neurosis, not to mention the possibility that some disturbance of the ovarian

internal secretion may result from the ovarian congestion and edema (Furniss, Dudley).

The diagnosis of the condition rests, to a large extent, upon the subjective symptoms, a careful consideration of the history of the case, and the absence, on examination, of any other tangible cause, for these varicose veins cannot be felt on bimanual exploration, unless thrombi or phlebolites form palpable tumors. I have, repeatedly, had the sensation of an indistinct resistance or fullness that would disappear between my fingers, but I have never been able to determine any definite contours.

As to treatment, one would naturally think of operation first, in analogy with the approved treatment of varicocele in the male, but the results of surgery are not uniformly satisfactory. Ligation and excision of the veins is by no means an easy procedure and may give rise to troublesome, and even fatal, hemorrhage. Besides, the relief obtained by operation is apt to be only temporary, since, if the cause persists, others of the many veins and sinuses in the pelvis may begin to ache. Taken all in all, conservative treatment promises better results. This must be both constitutional and local. The constitutional treatment consists of gymnastic exercises that develop the general muscular tone of the body, especially that of the abdominal muscles. Thin patients should be put on a high caloric diet, for, frequently, after a gain of from 10 to 15 pounds, the patients feel much better and are occasionally entirely relieved of their symptoms (Furniss). Regulation of the bowels is of prime importance and, wherever possible, there should be a change of work that would not necessitate long hours of standing every day.

Hot douches, the assumption of the knee-chest position at night to allow the pelvic veins to empty, sleeping with the foot of the bed elevated, and corseting to support the abdominal muscles constitute the local measures which often give relief. Richter, on the contrary, believes that protracted hot douches encourage the dilatation of the veins and suggests short, cold sitz baths, in order to exert a tonic effect upon the relaxed and dilated veins of the pelvis.

FOREIGN BODIES

Foreign bodies are occasionally found in the vagina and uterus.

Foreign Bodies in the Vagina.—Aside from pessaries, tampons, and the like, which were introduced for therapeutic purposes—legitimately, as it were—and then forgotten, an enormous variety of foreign bodies has been found in the vagina. Hairpins, pencils and penholders; spools, glass and cork stoppers; drinking glasses, pewter cups, pipe bowls and cold-cream jars; sponges, apples, candles and candlesticks; even a June bug!—this is but a partial list of the strange objects that have been introduced for purposes of masturbation or to satisfy the perversity of the sexual partner. These articles, if not too voluminous, may slip even through a fairly small hymeneal opening, but cannot be recovered again. Weiss reported, before the Gynecologic Society of Vienna, in 1899, a case of a pine cone found in

the vagina. In mature persons with wide vagina very large objects may be found. Kuestner refers to the case by Totmaczow where the drunken husband forced a water glass into the vagina of his wife. In a more recent case, reported by Aas, a girl of twenty-two who had missed her menses had introduced an oblong drinking glass, 9 cm. high, 5.7 to 7.6 cm. in diameter into the vagina "as a speculum through which her paramour might see the fetus."

There is no need of going into further details. The main object is to remind the practitioner that such things are possible.

One would expect that these foreign bodies at once cause severe irritation, but such is not necessarily the case. They may sometimes be tolerated for many years without producing marked symptoms. Kuestner and Neugebauer have collected quite a few illustrations from the literature—a water glass and a pipe bowl, each carried ten years; a spool wound with thread, borne for twenty-three years; a cotton tampon, retained twenty-nine years! Sharpe's patient wore her pessary thirty-five years, the last twenty-five years without once having removed it for cleansing. Sooner or later, however, pain, offensive discharge or bleeding will take the patient to the physician and lead to an examination. The history, as a rule, cannot be relied upon. Often, the patient may long have forgotten the incident. Again, her conscience will not permit her to tell the truth, and if, as so often is true, she is neuropathic, she will deliberately deny the facts.

A vaginal examination, therefore, is necessary in all cases, and Lombard very aptly says that, in the case of excessive discharge in youthful individuals, the possibility of a foreign body in the vagina must not be forgotten even though the hymen may appear intact.

Fortunately the diagnosis is easy, in most cases, by vaginal or rectal exploration, and only occasionally an X-ray photograph will be required when the foreign body has led to extensive ulceration. In a neglected case the shape of the foreign body may be so obscured by incrustations or by granulations growing around and over it that palpation alone cannot decide the diagnosis.

Treatment obviously consists in the removal of the foreign body with fingers and dressing forceps. This, at times, is extremely difficult. I know of a case where a pessary, embedded in the vaginal wall, had to be sawed through with a wire saw in different places before the extraction of the several pieces was possible. Again, in the case of broken glass, the removal may be difficult—not only because of danger to the soft parts from the cutting edges, but because of the inability to maintain a good grip on the smooth surface. To overcome these difficulties, the ingenious procedure devised by Landsman for the removal of broken glass from the rectum may be tried: With the patient in the knee-chest position, the vagina is exposed by a bivalve speculum. By means of a straight forceps, small squares of adhesive plaster are carried into the vagina, applied to the sharp edges and readily molded over the sides of the glass. The object may then easily be grasped with any long-handled forceps and delivered without any danger of slipping or wounding the walls of the vagina.

Where the foreign body has caused deep ulcerations, vaginal douches are needed during the course of healing. In certain cases, it may be necessary to apply an obturator to prevent the development of cicatricial stenosis.

Foreign Bodies in the Uterus.—In the case of foreign bodies in the uterus we have to deal largely with objects introduced by the patients themselves, or other persons, in an effort to produce abortion. The variety of such objects is very large; usually articles of daily use, such as hairpins and the like, or the long nozzles of syringes that are on the market for purposes of abortion. Not infrequently, however, the physician is the guilty person. Pledgets of cotton or gauze left in the uterine cavity in the course of treatment, the broken end of a uterine electrode or the stem of an intra-uterine pessary belong in this category. Sea-tangle tents may so swell within the uterine cavity that they cannot be removed easily. Silkworm sutures, introduced as a preventive to conception, may slip into the uterus and embed themselves in the endometrium.

The literature is replete with such instances of carelessness or criminal interference. These cases are not to be taken easily, because the foreign body may either perforate the uterus or produce a serious infection.

The diagnosis is by no means simple where no definite history is obtainable. Occasionally, an X-ray picture may be of assistance. In many cases, only the forcible dilatation of the cervix and either instrumental or digital exploration of the uterine cavity will secure the diagnosis, and yet this course of action may seem contra-indicated by the severity of the inflammatory symptoms.

The removal of the foreign body must be the aim of the treatment. Several writers have emphasized the technical difficulties of extraction. Thus, Schauta, in his efforts to remove an egg-shaped pessary which had lain in the uterine cavity for years, perforated the appliance repeatedly with a Pacquelin cautery, for the purpose of getting some means of grasping the ovoid body. The removal of smaller foreign bodies can generally be effected by means of the curet or the placental forceps (Reed), but care must be taken not to perforate the uterus and pull intestines downward. After the extraction, a strip of iodoform gauze should be placed in the uterus and an ice-bag upon the abdomen.

LITERATURE

Displacements

Beck. Am. Journ. Obst., 1917, 75: 515.
Eden and Lockyer. Gynaecology, 2d ed., 1920.
Gellhorn. Interstate Med. Journ., 1909, 16, No. 1; also Lancet-Clin., June 20, 1914.
—— Missouri State Med. Assoc., December, 1911.
Jaschke, von, and Pankow. Lehrb. d. Gynaekologie, 6th ed., 1921.
Schultze. Die Pathologie u. Therapie d. Lageveränderungen d. Gebärmutter, Berlin, 1881.

Prolapse

Eden and Lockyer. Gynaecology, 2d ed., 1920.
Fothergill. In Fairbairn's Obstetrics and Gynecology, 1921, 816.
Pollock. Medicine and Surgery, April, 1917.

Inversion

Brandao. Bol. da Acad. Nacion. de Medic., Rio de Janeiro, 1918, 89: 79.
Eden and Lockyer. Gynaecology, 1920.
Jones. Surg., Gynec. and Obst., 1913, 16: 632 (with extensive literature).
Swayne. In New System of Gynecology by Eden and Lockyer, 1917, 2: 698.
Zangemeister. Deutsche med. Wchnschr., April 14, 1913.

Varicocele

Clark. Am. Journ. Obst., 1902, 45: 537.
Dudley. New York Med. Journ., 1888, 147, 174.
Engelmann. Zentralbl. f. Gynäk., 1922, 46: 329.
Fothergill. In Obstetrics and Gynaecology, by Fairbairn, 1921, 540.
Furniss. Am. Journ. Obst., 1917, 75: 152.
Jewett. Am. Journ. Obst., 1917, 75: 500.
Linnert. Zentralbl. f. Gynäk., 1919, 43: 109.
Richter. Zentralbl. f. Gynäk., 1914, 38: 344.
Sampson. Tr. Am. Gynec. Soc., 1916, 41: 429.
Shober. Am. Journ. Obst., 1901, 43: 664.

Foreign Bodies

Aas. Abstr. Zentralbl. f. Gynäk., 1914, 38: 743.
Bovier. Lyon Médical, 1913, No. 52.
Gerschun. Abstr. Zentralbl. f. Gynäk., 1912, 36: 1060.
Kuestner. In Veit's Handb. d. Gynäk., 1897, 1: 319.
Landsman. Abstr. Journ. Am. Med. Assoc., 1922, 78: 965.
Lombard. Bull. di clin., 1887, 4: 535.
Neugebauer, von. Arch. f. Gynäk., 43: 373.
Reed. Diseases of Women, 1913.
Sharpe. Surg., Gynec. and Obst., 1907, 4: 276 (with good literature).

CHAPTER V

INFECTIONS

Inflammations of the female genital tract are almost altogether due to bacterial causes. Chemical, mechanical or thermic causes are relatively so infrequent that one may well consider inflammations and infections as synonymous.

Two facts are generally recognized: the great commonness of the infectious diseases of the female genitals and the rapidity with which they are liable to spread throughout the genital tract. Both these facts may be explained by a variety of reasons.

1. There is a continuous open passage from the exterior of the body through the vagina, uterus, and tubes to the peritoneal cavity.

2. The greater part of this passage is lined with delicate epithelium which is unable to offer resistance to bacterial invasion; and even the vagina which, with its solid squamous epithelium, ordinarily withstands microbial attacks, is without its natural means of defense in childhood, during pregnancy, and in the course of debilitating diseases.

3. A rich supply of blood-vessels and lymph-vessels favors rapid distribution of any bacterial poison.

4. The physiologic congestion at menstruation and during pregnancies has a weakening effect upon the power of resistance of the genital organs.

5. Throughout the reproductive period—and this means the greater part of a woman's life—the genital tract is frequently exposed to contamination from without (cohabitation, masturbation, unclean douche nozzles, unsterile digital or instrumental examinations and manipulations, etc.), and at the same time to traumatisms of various degrees.

6. While most infections are *carried* into the genitals from without, a torn perineum may enable bacteria to enter the vagina unaided (urine, feces).

7. Ordinarily, the bacteria which habitually live in the vagina and have become domesticated, as it were, as well as those which are introduced secondarily, are held in check by the acidity of the vaginal secretion. This protection is lost when the menstrual discharges or the lochia render the reaction alkaline.

GONORRHEA

It is customary to put gonorrhea at the head of the list of infections. The controversy as to whether the gonococci account for the greatest number of genital infections of the various pus-producing bacteria interests us less than the fact that gonorrhea causes the most variegated and extensive altera-

tions in the genital tract, that it produces the most serious effects upon the health and the life of the individual, and that, by its disastrous consequences, it exerts a baneful influence upon the welfare of the nation. Gonorrhea, therefore, may well be considered the most pernicious of gynecologic diseases.

Unlike most other bacteria the gonococcus requires no port of entrance, no local lesion. Implanted upon an intact mucosa, it penetrates readily through the interstices between the epithelial cells into the subepithelial tissues and there proliferates rapidly. As the infection, in the adult, almost always occurs during the sexual act, the gonococci are, as a rule, deposited simultaneously in the urethral opening and the external os of the cervix where they meet with particularly delicate epithelium.

As soon as they have multiplied enough to make an impression, which usually takes three or four days, they produce an inflammation with the cardinal signs of any inflammation in any other part of the body, namely, heat, swelling, redness, and pain. These signs are the natural results of the reaction of the affected tissues. The bacterial irritation causes hyperemia and emigration of large numbers of leukocytes and thereby produces a sensation of heat and uncomfortable dryness. The venous stasis which inevitably follows increases the size of the infected part (swelling) and gives it a highly reddened appearance. The leucocytes press onward into the superficial epithelium which they force apart or lift off and thus reach the free surface. This marks the beginning of the purulent secretion. The inflammation now becomes more intense. The round-cell infiltration grows more massive and by pressing upon nerve endings produces local pain.

In this acute stage, the urethral meatus is almost closed by deeply reddened, swollen, and protruding folds of the urethral mucosa. Copious, thin, greenish-yellow pus oozes from the opening and by dripping over the vulvar mucosa causes intense burning and itching and leads to rubbing and scratching which, in its turn, causes abrasions that may, secondarily, become infected. Under these circumstances, urination becomes burning, painful, and if, as is usually the case, the entire urethra is involved. the inflamed sphincter of the bladder answers with painful contractions.

Not every urethritis need be gonorrheal, yet, in such intensity as has just been described, only this specific infection is likely to be the cause. For his own sake, however, and in order to avoid unpleasant consequences, the physician should not make a diagnosis of gonorrhea until he has demonstrated the gonococci under the microscope, an easy task because, in this stage, the cocci appear in pure culture.

The first signs of infection in the cervix are not nearly so stormy as in the urethra, simply because the cervix is relatively devoid of sensory nerve endings. Yet the acute swelling of the vaginal portion impresses itself upon the consciousness of the patient as a sense of weight and fullness, and the abundant purulent discharge macerates and secondarily irritates the vaginal mucosa which, on digital examination, can be felt to be hot and roughened. The vaginal discharge pouring over the vulva, infects the ducts of the glands of Bartholin and may give rise to a bartholinitis, with or without abscess formation.

In some cases the acuteness of the inflammation will subside, spontaneously, within three or four weeks and the infection will remain limited to its original sites. The subjective discomfort decreases and eventually disappears, the purulent discharges become milky and non-corrosive, and to all outer appearances the patient is cured, though gonococci may be lurking in Skene's ducts, and a reddening like a flea bite around the Bartholin ducts, the *macula gonorrhoica* of Saenger, will for years persist as a pathognostic telltale.

Unfortunately, such favorable outcomes are far too few. In most instances, the pathologic process takes a different course or, having subsided for a time, returns with renewed vigor.

The extension of the gonorrhea from the urethra into the bladder is not very frequent and, unless helped along by an untimely catheterization or spontaneously by menstruation or childbirth, a cystitis is not very likely to occur, an involvement of the ureters and kidneys even less so; the stream of urine apparently prevents the nidification of the microbes.

Far more common is the extension of the disease from the cervix into the upper parts of the genital tract. The feeble barrier at the internal os which, for obscure reasons, temporarily checks the advance of the gonococci, is only too often broken through—spontaneously, by an excessive virulence of the cocci, in menstruation, after abortion, in the puerperium, by exertions or excesses; artificially, by instrumentation, a forceps, let us say, in labor, by the uterine sound or a curettage.

Then the clinical picture changes abruptly. An acute inflammation of the uterus, a true metritis, occurs. The entire organ increases in size, though the gonococci seem to invade the myometrium only rarely. The muscle fibers are forced apart by round cell infiltration and the same process, only more intense, takes place in the endometrium. There is severe pain in abdomen and back, with fever; thin purulent discharge issues from the uterus, and the menses become abundant.

The invasion of the tubes is the next and practically inevitable step; and, as the inflammation spreads along the preformed channel, the infected mucosa produces pus which cannot drain into the uterus because the isthmus of the tube is quickly closed by the swelling of the mucous membrane, but must drip into the peritoneal cavity, setting up an acute inflammation which, fortunately, remains localized, as a rule, in the pelvic portion of the abdomen, but produces the most severe manifestations of a general peritonitis. The outer end of the tube becomes sealed fairly quickly and the continued secretion of pus transforms the infected tube into a pus sac—a pyosalpinx. The surface of the ovary is exposed to the peritoneal inflammation and quickly surrounded by purulent exudate or adhesions; by way of reaction, its tunica albuginea thickens and prevents the maturing graafian follicles from bursting, so that retention cysts ensue. If, by chance, a follicle has just broken and a fresh corpus luteum admits the entrance of the microbes, abscess formation within the ovary is the result.

That this and the closure of the tube end all chances of future conception need hardly be emphasized. Exceptions to this rule are altogether too rare to have any practical importance. Beyond the question of fertility, there

is the more immediate question of the patient's health. Her life is not often in grave danger (though I have only recently witnessed a death from gonorrheal pyemia), but the patient is condemned to a state of invalidism and frequent recurrences are stirred up by the gonococci lying hidden in the two principal depots, the ducts of Skene and the cervical mucosa. The menses occur more frequently, more copiously and are more prolonged, and there is always more or less intense pain in the lower abdomen which undermines the nervous system, interferes with the ability to work, and destroys the joy of living. Take into further consideration the economic hardships, due to frequent medical and hospital care, and the acquired sterility, and you will easily appreciate the far-reaching influence of gonorrhea in the female.

Such, in bald outline, is the clinical picture which the practitioner should fill out by the reading of his textbooks.

Prevention is, theoretically, possible for we know from our experiences with ophthalmoblennorrhea of the newborn, that certain chemicals, chief among them silver nitrate, positively inhibit the implantation of gonococci; but, unfortunately, there are no suspicious symptoms soon after exposure, and when these signs finally develop, the cocci have already invaded deeper tissues beyond the reach of any bactericide. Some day, let us hope, there may be a prevention on a grander scale. That will be the time when the hypocritical puritanism of our day will be swept away by safe and sane thinking and when every girl will demand from, and exchange with, her husband-to-be a certificate of health, testifying not only to freedom from gonorrhea, but from other communicable diseases as well.

TREATMENT

Meanwhile, however, and for many years to come there is need for intensive treatment.

That such treatment is somewhat complicated and makes great demands on his time and perseverance, the practitioner must realize at the start, and the fact that the results are most often disappointing must not lead him to a therapeutic pessimism. I shall mention later the points essential in determining when a case of gonorrhea may be considered cured. It is certain that there is no one single method of treatment that is free from failures. New drugs and new procedures are constantly being recommended as "sure cures," but their very multiplicity demonstrates the deficiencies of our means. Let us admit that, with many of them, the desired success may be achieved now and then, and let us remember that we have to change from one method to another, if the case under treatment proves obstinate. It is for this reason that a fairly wide variety of therapeutic suggestions will be presented.

The essential premise for any form of treatment is the coöperation of the patient. She must know of the seriousness and infectiousness of her ailment and of the prime importance of systematic and persistent treatment. She must be made to understand how easily she may reinfect herself by

contaminated fingers, syringes, douche nozzles and the like, or by sexual intercourse. That the husband, too, has to be taken in hand is self-evident. All this requires a great deal of tact lest an incautious word lead to psychic depression or destroy the peace of the family. A great deal has been written about the question of telling the truth to the infected wife. No definite rules of conduct can be given. It is the best course in some cases; in others, it would work incalculable harm. Too much stress has been laid on the "fault" of the man. Only he is guilty who *knowing* that he was sick, infected his wife. In the great majority of instances the cause of the mischief is the ignorance of the man who thought himself long cured of the disease acquired in his earlier years, when ignorant of the perils to which he exposed himself. If we *must* speak of fault and guilt, the term may often be applied to the physician who, after an insufficient examination, has pronounced his patient cured and told him that it is safe to marry.

The general treatment demands absolute rest in bed during the acute stage, and even in the chronic stage the patient should take to her bed during menstruation. Heavy work is interdicted during the course of treatment, likewise dancing, horseback riding, and other physical exertions. Sexual intercourse belongs to the factors which favor extension of the disease. The diet should be bland, bowel action regulated, and alcoholic drinks forbidden, the latter precaution not being altogether superfluous even in these days of prohibition. Intra-uterine manipulations are gross mistakes in the acute stage of the disease.

Local Treatment of the Urinary Tract.—In the acute stage of gonorrheal urethritis the painful swelling of the meatus is relieved by warm compresses with acetate of lead, boric acid, or aluminum acetate. Diuresis is increased by copious draughts of milk and a tea made of folia uvae ursi (teaspoonful in a cup of hot water, three times a day). Some authors prescribe urotropin with salol, each 0.5 (gr. 7½) or helmitol 1.0 (gr. 15) three times daily. Also

℞ Acid. phosphor..... 12.0 (℥ 3)
Syr. Rubi Idaei.....q. s. 120.0 (q. s. ℥ 4)

or

℞ Acid. sulph. aromat..... 12.0 (℥ 3)
Syr. simpl.....q. s. 120.0 (℥ 4)

S.: Teaspoonful in a tumblerful of water every two hours.

In view of the fact that the gonococcus, like the colon bacillus with which it is often associated, thrives in acid urine, I prefer alkaline diuretics. Kelly recommends the following:

℞ Potas. acetatis..... 15.0 (℥ ½)
Tinct. hyoscyami..... 15.0 (℥ ½)
Aquae.....q. s. 120.0 (℥ 4.0)

S.: Teaspoonful in a third of a tumblerful of water every three hours.

To relieve painful tenesmus, rectal suppositories containing extr. belladonnae et opii, or codein 0.02 (gr. ⅓) may be inserted once or twice a day. Warm sitz baths followed by liberal dusting with stearate of zinc and the like are likewise indicated.

Furthermore, daily injections into the urethra of a 1 to 2 per cent protargol solution are made with an ordinary medicine dropper, or a glass syringe with a soft rubber tip. If the meatus is too sensitive the swollen mucosa is first touched with the following:

℞	10% cocaine solution.....	10.0	(ʒ 2½)
	Sol. adrenalin 1 : 1000.....	5.0	(ʒ 1¼)

Catheterization should be avoided at this stage so as to prevent the ascent of the infection into the bladder. In the subacute stage, stronger solutions of protargol are used for the injections. A large number of other drugs such as argyrol, albargin, argonin, choleval, ichthargan, have been recommended by trustworthy authors for this local treatment, but by far the most reliable medicament is silver nitrate which may be injected at first as a ½ per cent, later a 1 to 2 per cent, solution. The injections are made daily

Fig. 48.—Kelly's Endoscope (Kny-Scheerer).

in the beginning and the intervals are gradually lengthened. An intelligent patient may be taught to make these instillations herself. Of internal remedies, balsam of copaiba, 15 minims in capsules, three times a day, or Gonosan may be administered. Of the latter, Bandler says that it is the active principle of kava-kava dissolved in sandalwood oil. The dose is one or two capsules four times a day after meals. It lessens secretion, checks the growth of gonococci, is a diuretic, and prevents pain.

Chronic urethritis requires more energetic cauterization. "A small Kelly endoscope (Fig. 48) is passed up to the neck of the bladder, but not into it. The urethra is then swabbed with cotton-wound uterine applicators, soaked in a 5 per cent solution of silver nitrate, the urethra being intolerant of a stronger solution except under anesthesia. As the reddened wall of the urethra rolls into the lumen of the endoscope during its withdrawal, it is touched with the tip of the applicator. It is well to have at least two applicators ready for use and dipped in the silver solution before beginning the

treatment, for economy of time is of value. The pain may be lessened in particularly sensitive patients by first inserting in the urethra an applicator with its cotton-soaked solution of cocaine hydrochlorate (10 per cent). By holding the thumb against the shaft of the applicator, the applicator may be withdrawn and the cotton left in the urethra. After five minutes the swabbing of the urethra with silver nitrate solution may be proceeded with." (Kelly.)

Bandler wraps cotton about the tip of a modified Braun syringe with numerous lateral openings, the fluid being injected to moisten the cotton after introduction into the urethra (Fig. 49). By gently withdrawing the tip of the syringe, the cotton may be left in place for any desired time. With this method, protargol is preferable to silver nitrate.

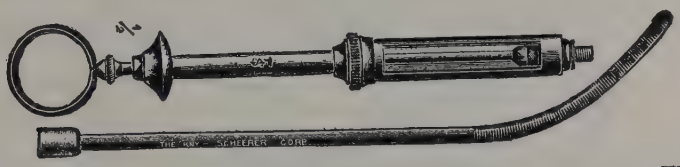


FIG. 49.—MODIFIED BRAUN'S SYRINGE WITH NUMEROUS LATERAL OPENINGS. When the tip is covered by a layer of cotton, firmly applied, the drug is injected after the tip is introduced into the uterus. The cotton becomes impregnated with the solution and is evenly applied to the mucosa. No free fluid enters the uterine cavity and contractions of the uterus cannot force any fluid into the tubes. The cervical canal must be well dilated before using this syringe. The same procedure is applicable to the urethra (Bandler).

As the specific inflammation subsides, astringents are used to diminish the hyperemia and hypersecretion, such as zinc sulphate 1:500 to 1:100 or acetate of lead 1:100 to 1:50.

In obstinate cases where a prolonged effect is desired, urethral suppositories, 2 inches long and ⅛ of an inch in diameter, which can be made by any druggist, are valuable.

Bandler suggests the following combinations:

℞	Iodoform.....	0.0054	(gr. 1/12)
	or		
	Protargol.....	0.0054	(gr. 1/12)
	or		
	Arg. nitr.....	0.0054	(gr. 1/12)
	or		
	Ichthargan.....	0.0054	(gr. 1/12)
	or		
	Zinc. sulph.....	0.0054	(gr. 1/12)
	Butyr. cacao.....	0.5	(gr. 7½)

F. tal suppositoria urethrales (2 inches long, ⅛ inch thick) No. 10.

The treatment of gonorrheal cystitis, which is rare, will be considered in Chapter VIII.

The *ducts of Skene* require separate treatment in *every case.* If they are hidden within the urethral meatus, they can easily be exposed by means of bent hairpins, held in forceps according to the ingenious method of Kelly (Fig. 50). A drop of a 2 to 10 per cent silver nitrate solution is injected into each duct with an ordinary all-glass hypodermic syringe, the needle of which has been filed off so as to blunt it. If this treatment fails and pus can still be milked out of the ducts after a fair trial, the ducts

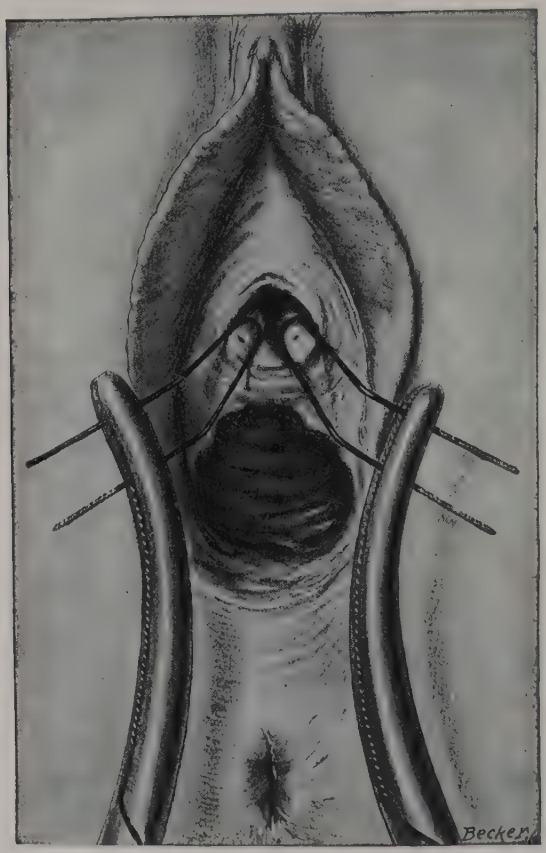


FIG. 50.—BENT HAIRPINS GRASPED IN ARTERY FORCEPS AND USED AS A SPECULUM TO EXPOSE THE ANTERIOR PORTION OF THE URETHRA, MORE PARTICULARLY THE ORIFICES OF SKENE'S GLANDS (from Kelly, *Medical Gynecology*).

may be slit open under local anesthesia and cauterized or, better still, be laid open and burned out with a pointed electrocautery or electric needle.

Local Treatment of the Genital Tract.—1. CERVIX.—In the acute stage of gonorrheal endocervicitis, practically all authors enjoin rest in bed and abstinence from local treatment lest the ascent of the infection into the uterine cavity be hastened. Digital or speculum examinations must be omitted so as not to disturb the reaction of the affected tissues. On the other hand, it seems illogical to leave the inflamed cervix without any support

against the gonococcal invasion and I can recommend, from my own favorable experience, the method of Nassauer who blows a fine powder—bolus alba or kaolin—into the vagina by means of his "siccator." I shall have to speak in detail of this treatment in another chapter. The powder, which may, if desired, be impregnated with an astringent or bactericidal drug, not only interferes with the growth of the bacteria, but also protects the vagina and vulva from the irritating and infecting influence of the purulent discharge. The insufflation is made daily and a warm cleansing douche with bicarbonate of soda, camomile tea, or weak potassium permanganate solution is given *very slowly* and under low pressure every other day. The patient quickly learns to use the handy little appliance herself. It must, of course, be sterilized after each treatment. By using equal parts of kaolin and bicarbonate of soda, I find that douches become unnecessary; there is usually no remnant of the powder in the vagina on inspection.

In some cases, I have found a 2 per cent silver nitrate ointment in equal parts of lanolin and white vaselin highly serviceable. It is either injected with an ointment syringe (see vulvovaginitis below) or introduced by means of a soft tampon. No douches are given. It greatly ameliorates and shortens the initial phase of the disease and seems to prevent the extension of the infection into the vulvovaginal glands. The treatment is given daily during the acute stages.

In the chronic stage, the former edema has disappeared, but the cervix remains larger and harder than normal because of the overgrowth of the mucosa and new formation of fibrous tissue. The cylindrical epithelium of the cervical canal usually grows out upon the vaginal portion and replaces the squamous epithelium. Hence, we find an irregular zone of highly reddened tissue around the external os or upon one of the cervical lips, an "erosion." In uncomplicated cases, there is no particular pain, but the patients complain of a persistent, thick, ropy, yellowish discharge against which no amount of douching is of any avail. The microscopic demonstration of gonococci in the discharge is very difficult because, owing to the alkalinity of the purulent secretion, other bacteria have gained ready access to the cervical canal, particularly if the external os is wide from a previous birth traumatism. In a smear, the field of vision is filled with innumerable microbes among which gonococci can rarely be identified.

The customary treatment consists in the frequent applications of tincture of iodin, nitrate of silver, formalin, ichthyol, etc., by means of cotton wound around thin applicators, Playfair sounds, etc. New chemical preparations are being recommended constantly for this purpose.

Albrecht and Funk recommend the following routine: The patient takes one or two vaginal douches daily with a 30 to 50 per cent chlorid of zinc solution, one tablespoonful in one quart of water; in the evening, a hot sitz bath of ten minutes' duration. The physician applies nitrate of silver 1:5000 increasing to 1:100 once or twice a day by introducing a sponge or gauze soaked in the solution through a speculum and leaving it in place five minutes. This is followed by intra-cervical application of 5 to 20 per cent formalin, the latter only every three or four days. Then follows the intra-cervical intro-

duction of a 10 per cent protargol suppository, 2½ cm. long, and, finally, the entire vagina is filled with an impregnated powder.

Clark's procedure is much more simple. The cervix is exposed in a speculum but not drawn down with a tenaculum. The cervix is then cleaned with a 1:1000 bichlorid solution or is painted with a 5 per cent iodin solution. If the uterine cavity is quite sensitive, a fact that may be ascertained by passing a sound under direct vision, being careful never to permit it to come in contact with the speculum, 1 c.c. of a freshly prepared 5 per cent solution of sterile novocain is injected with a Braun's syringe. The slender nozzle of the syringe is introduced *very gently,* until the top of the fundus is reached, and then the solution is *slowly* expelled. This will prevent uterine spasm. From three to five minutes later, 1 c.c. of a 5 per cent solution of iodin is injected in the same way. These treatments are given twice weekly, for four or five weeks; then a month is allowed to intervene without treatment in order to observe the result.

This or any other form of topical treatment may be combined with the yeast treatment originated by L. Landau who found that when certain bacteria were brought into contact with yeast they were quickly destroyed. Abraham used yeast to which he added kaolin, sugar, and salts; this powder is manufactured under the trade name "Xerase," and a number of similar products are in the market under different names. A tubular speculum is introduced into the vagina, and the cervix and the vaginal walls are thoroughly cleansed with cotton. One or two teaspoonfuls of the powder are then blown against the cervix and the vaginal walls by means of an insufflator or merely poured into the vagina and held in place by a tampon.

More recently, rather good results are claimed for the treatment with "spuman." This substance is a mixture of various antiseptics and astringents (formalin, bismuth, alum, hexamethylenetetramin) with tartaric acid and sodium bicarbonate; to this protargol or silver nitrate is added. When spuman is introduced into the genitalia, the secretion, by contact with the tartaric acid and sodium bicarbonate, produces a carbonic acid body which distends the vagina and thus, by pressure, distributes the effective chemicals into all the folds and crevices of the mucosa.

For use in the urethra or cervix spuman suppositories, also called styli or bacilli, of various thickness and length are procurable and are introduced well lubricated with glycerin, once or twice a day, later two or three times a week. If there is any pain, a cocain stylus is inserted. Holzapfel who describes the technic in detail enjoins an hour of rest after each treatment and warns against pushing the stylus into the uterine cavity.

In the vagina, Holzapfel applies no specific treatment because he thinks that no direct infection takes place. Antiseptic douches may, however, be taken to wash out the irritating discharges. Nassauer's powder treatment is preferable to douches, and better still is a thick spuman stylus, self-inserted two or three times a day. A vaginal pad is worn, and occasionally a cleansing douche is taken.

Asch who for more than thirty years has been the exponent of systematic local treatment, uses smooth and very fine, pliable applicators of silver or

a metal alloy called "nickelin" which are bent according to the form of the uterus as ascertained by bimanual examination. The applicator is armed with long-fibered cotton which is saturated with the bactericidal solution. This sound glides easily into the uterine cavity and, as it is withdrawn, the cotton remains behind, but is expelled a few minutes later by the contractions of the uterus, after the fluid has been evenly distributed over the endometrium and cervical mucosa. He avoids strongly cauterizing and irritating substances and recommends instead iodin in vaselin or oil, or ichthyol.

Findley favors a much more active régime. A general anesthetic is given and the cervix dilated. A 30 to 50 per cent solution of zinc chlorid is swabbed over the infected surface. After an interval of ten days, a 5 per cent solution of zinc chlorid should be injected through the cervix into the cavity of the uterus. But two or three drops of the solution should be injected. These treatments are repeated at intervals of ten to fourteen days. Not more than six or eight injections should be made for fear of too great a destruction of tissue. The injections are given with a solid piston tonsillar syringe, with a long curved cannula of a caliber that will permit of easy introduction through the cervical canal without dilatation. No anesthetic is required.

Bab and others have been favorably impressed with the efficiency of "argochrom," a methylene blue powder containing 20 to 40 per cent silver. Bab uses this preparation intravenously, orally, and locally at the same time.

The intravenous injection of vaccine, collargol and other substances has rather generally been disappointing; at best, one may say that the effect of the local treatment seems thereby a trifle intensified, while, on the other hand, the intravenous therapy in itself is not without serious objections.

The foregoing is not a complete list of the procedures recommended but it represents the chief types of treatment. That permanent cures may be achieved in a certain percentage of cases by many of these methods, cannot be doubted. More often, however, though the discharge decreases more or less promptly and the gonococci disappear in the smears, the local improvement is of short duration, and reappearance of the discharge requires again and again a repetition of local treatment. The reason is obvious. After all, these are merely surface applications, lasting only a few minutes, and the chemical agents cannot possibly penetrate into all the crypts of the endocervical mucosa, or into the deeper layers where the cocci are hidden. To overcome this evident drawback and to secure a more lasting action, the introduction into the cervical canal of suppositories impregnated with some germicide (see above), or the dilatation of the canal followed by tamponade with an antiseptic gauze, have been practiced with very contradictory results. And there is, in all this intracervical treatment, the danger of passing beyond the internal os and contributing to the spread of the infection.

For all these reasons I have, for some time past, given up the topical applications. At present I am testing the following three methods which are used either alone or in combination: (a) infiltration of the cervix with methylene blue; (b) heat penetration; (c) powder treatment.

Methylene Blue Infiltration.—The principle of the method is to reach and destroy the gonococci in the very tissues where they reside. The following points are pertinent:

1. The cervix is exposed in a bivalve speculum and steadied by a volsellum or sharp hook. The vaginal discharge is wiped out and a smear is taken from *within* the cervical canal. If this smear contains typical or suspicious diplococci or, in chronic cases with a suggestive history, an abundance of pus cells, the following solution is used:

℞	Methylene blue (chemically pure)	1.0	(gr. 14)
	Normal saline solution	100.0	(℥3)

This solution is sterilized by boiling and is injected *into the tissue* of the cervix at the four points of the compass, parallel with the cervical canal and at the border of mucosa and stroma, that is, ½ cm. from the external os. The difference in consistence plainly indicates this border. For subsequent injections the points of the compass are shifted slightly, so as to avoid the sites of previous injections.

2. Do not use long needles lest you penetrate into the tissues beyond the uterus (which has happened twice in my cases) but insert an ordinary hypodermic needle, about 3 cm. in length. Begin injecting after the needle has been inserted to its full length and continue the injection as you slowly withdraw the needle. Use 1 to 2 c.c. at each point of injection. By choosing sharp needles and injecting the fluid slowly, very little, if any, pain is caused.

3. Repeat the injections twice a week and note the change in the appearance of the discharge. The latter, as a rule, loses its purulent quality after the third injection.

4. Examine smears after the cervical secretion appears macroscopically normal and continue the injections as long as gonococci or pus cells are present. When smears become negative, discontinue the treatment but make microscopic examinations at weekly intervals and resume the injections, if cocci or pus cells should reappear.

5. During menstruation the injections need not be interrupted.

6. Four successive smears with negative findings constitute proof of cure. One of these smears will, naturally, be taken after a menstruation. Another smear should be examined a day or two after a *condom* intercourse, and, finally, one after "provocation" (page 99). It is necessary to guard against the possibility of reinfection.

7. The average number of injections in my successful cases has been six.

8. The discoloration of the cervix remains for a day. The color of the urine is greenish for about the same time. No ill effects on the kidneys have been noted.

9. No douches are given during the course of observation. Any excess of methylene blue which may escape into the vagina is kept there by a cotton tampon, or by means of kaolin insufflated after the treatment.

I offer this method to the practitioner as a suggestion because of its simplicity. The results, to be sure, are not uniform. I have had very brilliant

successes side by side with recalcitrant cases. Only one of my patients experienced discomfort for an hour or two after treatment, namely, nausea and a bearing down feeling "as if menstruation were about to start."

Through the courtesy of Dr. Brooke M. Anspach, Professor of Gynecology in Jefferson Medical College, in Philadelphia, Dr. F. H. Hustead has tested my method in the Gynecological Dispensary of the Jefferson Medical College Hospital. In his report, Dr. Hustead stated that the injections were painless, that in most cases the smears became negative, and that the discharge decreased or ceased altogether. He found, however, considerable local irritation at the points of injection caused by "pressure necrosis" which, in its turn, required daily douches with saline solution to heal. For this reason he found difficulty in persuading his patients to return for observation. Not having had any experience with this irritation in my cases I am at a loss to account for it. I found on the contrary that the patients demanded repeated injections once they learned by experience that there was no pain to be feared and that the discharge, which had resisted all former treatments, fairly promptly disappeared under the new treatment. In view, however, of Dr. Hustead's notes, I merely present my observations as a preliminary report in the hope that others may give the method a trial.

Heat Penetration.—By exposing the cervix to high degrees of heat, a strong arterial hyperemia is produced which increases the natural resistance of the tissues and aids them in repulsing the bacterial invasion. Heat is, therefore, a valuable adjunct, if used with other methods. I have employed it in the form of prolonged douches (page 161). Others recommend diathermy with a specially constructed electrode in the cervix, the other electrode on the abdomen or back. The assumption that the gonococci could be killed by thus raising the temperature of the tissues has not been substantiated. It would seem to require degrees of heat which would also destroy the tissue cells.

This principle may be potent in another form of thermopenetration which is particularly advantageous in chronic cases, namely, cauterization with the Paquelin, according to Hunner's suggestion. Deep radial incisions are made with the blade of the Paquelin cautery. Two or three weeks are required for the resulting slough to be thrown off and new tissue to be formed. The treatment, then, should be given only once a month, preferably a week after menstruation. Handier for office work is Dickinson's adaptation of the nasal cautery (page 287). Both methods sometimes yield excellent results. It may be that the intense heat actually destroys the cocci in the tissues; but as the duration of the application is very short, it seems more likely to me that thermocauterization, in its last analysis, is merely a form of protein therapy which is discussed in Chapter XXII, that is to say, the cell débris resulting from the burn, are re-absorbed, and, acting as foreign protein, stimulate the infected tissues to renewed activity.

The Insufflation of Powder.—Nassauer's powder treatment (page 349) has, in my hands, been more satisfactory in fairly recent than in old chronic cases; even in these it may be given a trial.

Generally speaking, none of the methods discussed is absolutely certain

of result. The condition demands a great deal of perseverance both on the part of the physician and of the patient, and the practitioner may have to change from one method to the other in the course of his treatment.

Surgery has, to my mind, absolutely no place in the treatment of gonorrheal cervicitis, no matter how inveterate the case may be, and amputation of the cervix or curettage are mentioned only to be condemned.

2. Uterus, Tubes, Ovaries, and Pelvic Peritoneum.—It may be, though I have never seen it, that occasionally gonorrheal infection of the uterine cavity remains limited to the uterus. For practical purposes, however, the generalization of the infection may be considered as inevitable, once it has ascended above the internal os. For that reason, the treatment as a whole or all affected parts may be discussed at once.

In the acute stage no gynecologic manipulation is permissible. Rest in bed, ice-bags or cold compresses upon the abdomen, Fowler's position (to encourage encapsulation of any exudate in the pelvic cavity), oil enemas, a bland anticonstipation diet, and opiates in rectal suppositories, with or without belladonna, form the treatment. Sometimes antipyretics (aspirin, salipyrin, phenacetin, pyramidon) relieve pain and sleepnessness. This palliative treatment is continued for three weeks after fever and pain have subsided and the leukocyte count has returned to normal.

In the subacute stage, but not until then, a very cautious absorbent treatment may be instituted. This consists, in the main, of hot compresses, protracted hot vaginal douches through a bath speculum (Fig. 51) or in the form suggested on page 161, dry heat (Chapter XVIII), and hot sitz baths with salt (Chapter XVII). Any rise of temperature or increase of leukocytes demands a pause of a week. Glycerin or ichthyol-glycerin tampons properly applied (Chapter XII) are of decided help. According to Landsberg, the effect of absorbent treatment is intensified by subcutaneous injections of a 1 per cent calcium lactate solution. From 3 to 4 c.c. are injected in various parts of the body every two or three days, not more than 10 c.c. being used each time.

If, after four weeks of this treatment, there are still adnexal tumors or exudates present, an attempt with pressure treatment is indicated (Chapter XIX), but temperature and leukocytes require constant watch. Amann says very correctly that it is the persistent treatment of the *first* attack that counts.

During menstruations, the treatment is interrupted and the patient should stay in bed, because the periodical afflux of blood is apt to stir up the inflammation. For this reason, Van de Velde, of Holland, has suggested giving such patients X-ray treatment over the ovarian regions which would stop the menses for several months, during which time the organs now set at rest, would be more amenable to conservative treatment. I am not aware that his suggestion has been tested on a large scale. My own few observations have been inconclusive, but the idea seems reasonable.

Bleeding and discharge should not be treated locally, that is, by intrauterine applications, for these are quite ineffectual. Curettage is the very last thing to think of, as it not only does not check the symptoms, but is almost certain to bring on a recrudescence of the inflammation; and relapses

are only too frequent despite the greatest care. The pus in the tubes becomes sterile quickly enough, but, unless the hidden deposits of gonococci in Skene's ducts and cervical glands have been eradicated, there is always a possibility of a new assault of the gonococci upon an already weakened territory.

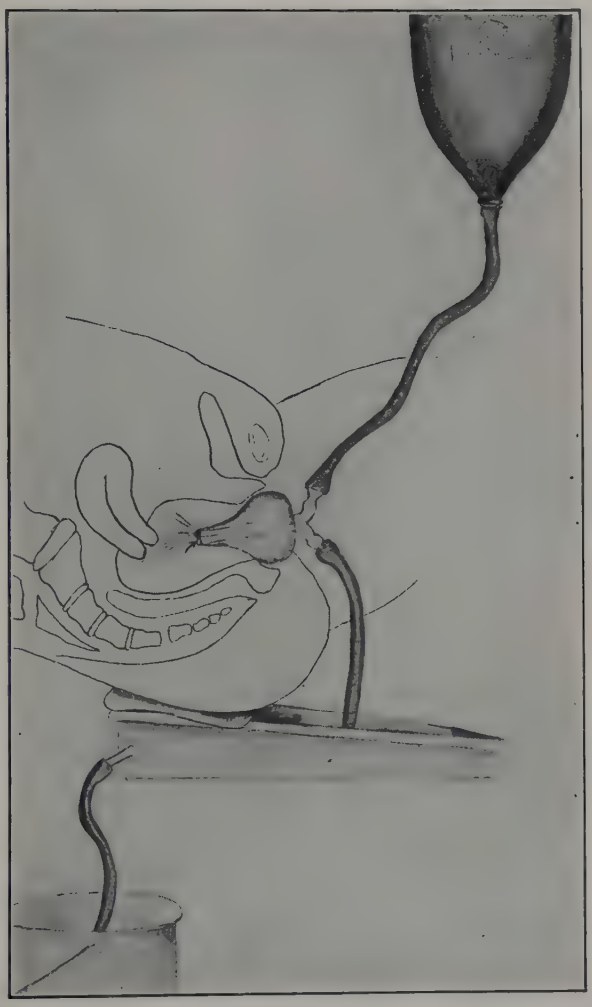


FIG. 51.—BATH SPECULUM FOR PROTRACTED VAGINAL DOUCHES. The pear-shaped glass bulb closes the vaginal entrance. The hot water flows in through a central canal and runs out through a second canal without touching the sensitive mucosa of the vulva (redrawn from Stoeckel).

The expectant treatment, thus far described, has been in vogue for many years. More recently, two entirely new methods have been recommended. The first of these, a specific therapy with gonococcus vaccine, at first raised our expectations high, but I believe it has now rather generally been abandoned. The second, a non-specific therapy with protein injections, is, to my mind, infinitely more promising. I refer here to the detailed description in Chapter XXII. I believe that a combination of protein therapy and absorbent

treatment will eventually solve the problem, but I am not overlooking the possibility that even then there will be a good many refractory cases and instances in which the pelvic peritonitis has left permanent alterations behind in the form of adhesions, displacements, ovarian enlargements, etc., which require our attention.

The question will then arise as to what extent surgical means should be employed. There is already a reaction from the purely surgical treatment of chronic ascending gonorrhea. Up to now, gonorrheal adnexal disease was a positive indication for operation to the gynecologist with a strong surgical bend. With the advent of the protein therapy conditions will change, and the operative removal of the diseased organs will become less often necessary. The social status of the patient, too, has to be considered. A woman of means, who can afford to give time and money to conservative treatment will, other things being equal, be able to evade operation more easily than a hard-working woman of the wage-earning classes, who must be restored quickly, even at the expense of her genital organs. This much is certain that the *exclusively* surgical era in the treatment of gonorrheal adnexal disease is at an end.

3. Vagina.—The vaginal mucosa is not likely to be primarily infected by the gonococcus, because of its protecting squamous epithelium. When in the acute stage of cervicitis the purulent discharge passes through the vagina in large quantities and, with the patient in bed, accumulates there, the vaginal epithelium frequently becomes macerated and infected secondarily. In the speculum, the mucosa appears highly reddened and it feels hot and rough to the examining finger. This stage lasts but a short time, as the infection can make no headway against the many layers of stratified epithelium. In pregnancy, however, the entire vagina is physiologically softened and less resistant, and any gonorrheal infection at that time causes a much more pronounced and prolonged inflammation of the entire vaginal canal.

The same softness prevails normally in the vagina of children. In these, the source of infection is only rarely an attempted coitus (rape), but more often transmission through sleeping with an infected mother or sister or, still more frequently, contamination from infected bed linen, towels, sponges, bath water, toilet seats, etc. For this reason, veritable epidemics have occurred in orphan asylums, boarding schools, and the like.

The prevention of this *vulvovaginitis in little girls* depends first and foremost on the education of the mothers as well as the managers of asylums. Abt (quoted by Stein) emphasizes the importance of a general technic of asepsis in the handling of children, including the wearing of gloves by the nurse, and the use of individual beds, thermometers, soap, towels, bedpans, etc. Taussig urges, in this connection, the installation of open, U-shaped toilet seats.

The therapy of vulvovaginitis is difficult to carry out and time-consuming and, after all, highly unsatisfactory, to judge from the multiplicity of methods and medicaments recommended. The most popular mode is that of vaginal douches containing permanganate of potassium (1:2000), or a silver salt, such as silver nitrate, protargol, argyrol, and the like. Instead of silver nitrate,

ichthyol (5 per cent) may be used. If a watery solution shows signs of being irritating, the antiseptic may be combined with glycerin or mineral oil (Anspach). The one great drawback of all these instillations is that the bactericidal agent remains in contact with the inflamed mucosa only a short time and that it has no opportunity to penetrate into the crevices of the vagina.

Vaccines are praised highly by some and declared useless by others. I have seen no satisfactory results in the limited number of cases in which I have tried the treatment.

Weiss proposed daily prolonged and very hot baths, but the literature, aside from a few successful cases, soon contained so many reports of alarming by-effects that I have not given the method a trial.

For the last four years I have, instead, employed silver nitrate in the form of a 1 per cent ointment (silver nitrate 1 part, lanolin and white vaselin, of each 50 parts). This ointment is injected into the vagina through an ordinary glass syringe with a slender nozzle, to which a piece of soft rubber catheter or tubing, about three inches long, is attached (Fig. 52). The tubing

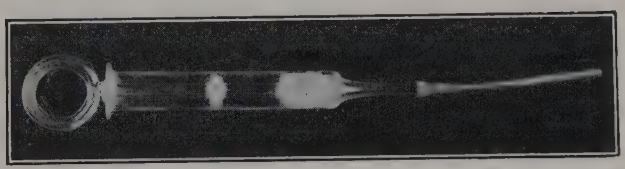


FIG. 52.—A "TRIUMPH" SYRINGE. This has a slender nozzle to which a piece of soft rubber tubing is attached for injection of ointment in gonorrheal vulvo-vaginitis. It can be introduced without pain into the vagina of even a very small child.

is changed for each patient. It can be introduced without pain into the vagina of even a very small child, and is slowly pushed inward the entire length of the vagina. The latter, then, is very slowly filled to capacity with the silver salve. The excess which oozes back through the hymenal opening is not wiped off as it is meant to cover and protect the irritated vulva and its surroundings.

The treatment is given once a day, without any additional douching. Every seventh or eighth day, after a day of rest, a smear is examined, and the injections are continued if gonococci are present. If they are absent, smears are made at intervals of three days without any further treatment, until at least three have been found negative. It is then advisable to send the child home but insist on a final examination in two weeks. Occasionally, provocative silver nitrate injections (5 per cent) are made and smears examined subsequently.

The discharge and outer excoriations, as a rule, disappear very quickly. In some cases, a scant, watery discharge persists for a short while, which may harbor gonococci. But even where there is no discharge at all, it is necessary to scrape off some vaginal secretion by means of a very thin, dull spoon (Fig. 53) lest the presence of gonococci be overlooked. In favorable cases the duration of treatment is from three to four weeks; a treatment of six weeks is a fair average.

Where there is a return of gonococci in the smears after an absence of weeks or months (I am at present treating a recurrence after a lapse of two years), or where the discharge cannot be freed at any time from the microbes, one must assume that, contrary to the usual behavior of the disease in childhood, the gonococci have invaded the cervical canal. Instances of such an ascending gonorrhea in children with the formation of pyosalpinx or pelvic abscess are well known, though, fortunately, they are not frequent. This persistence of the infection in the cervix may also explain certain hitherto obscure cases of dysmenorrhea in virginal persons, in whom pelvic adhesions were found on laparotomy.

The treatment is so simple and painless that it may be intrusted to nurses or mothers, under supervision. It is desirable to prescribe only small quantities of the ointment, because silver nitrate is quickly decomposed and thereby becomes either inert or irritating. Discolored preparations should be discarded.

Stein, writing from the Michael Reese Hospital in Chicago, fully confirmed the efficacy of my method. He substituted 1 per cent mercurochrome for the

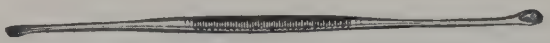


Fig. 53.—Small Dull Spoon to Obtain Secretion from Urethra or Cervix (model of Asch).

silver nitrate with very satisfactory results. I have adopted his suggestion to the extent that I inject the two ointments alternatingly.

4. Vulva.—*Vulvitis.*—The vulva becomes secondarily irritated from the pus exuding from urethra and vagina. The mucosa is diffusely reddened; here and there are small ulcers, and the labia are swollen. The pain is very marked. In the acute cases, frequently renewed compresses, wrung out of cool solutions of boric acid, acetate of lead, acetate of aluminum, etc., give relief. In other cases, surface applications of a 1 to 2 per cent solution of nitrate of silver followed by an indifferent salve (cold cream, 15 per cent boric acid in lanolin and white vaselin ana, etc.), are made daily or at longer intervals. Scrupulous cleanliness is, of course, never to be neglected. Occasionally, the pain is so severe that cocain (5 per cent solution) has to be applied.

Condylomata Acuminata.—Condylomata acuminata are small papillary growths upon the external genitals which are usually caused by the irritating gonorrheal discharge but may also be due to other causes, such as lack of cleanliness, non-specific discharges, fistulae, etc. If they occur singly or in small groups, they may be burned off with a nasal cautery or snipped off with scissors, the base to be cauterized with nitric or carbolic acid. Larger accumulations, which sometimes form extensive tumors and, as in one of my cases, interfere with delivery, may be excised surgically. I have not had to resort to operation since I found, a few years ago, that these tumors almost literally melt away under radium treatment. Similarly good results have been reported from the use of X-rays.

Bartholinitis.—Secondary infection of the Bartholin glands is rather frequent. If an abscess forms in the body of the gland, incision and drainage

or excision of the entire gland is indicated. If the infection is limited to the duct, daily instillations of a ½ to 1 per cent solution of silver nitrate, by means of a hypodermic syringe with blunt needle, are required. The openings of the ducts, while very small, may be made visible by a magnifying glass.

5. Rectum.—The rectum is infected secondarily much more frequently than is generally realized and may readily become the starting point of a recurrence. In the acute stage, the proctoscopic examination reveals swelling and reddening of the mucosa, which is covered with pus and may exhibit superficial ulcers. Distention of the rectum causes pain; the patients, therefore, delay regular bowel action, and the hardened stool causes anal fissures. In the chronic stage, the ulcers may lead to periproctic abscesses and formation of fistulae; even rectovaginal fistulae have been observed. The treatment consists of local application of pure ichthyol, or of suppositories or ointments containing silver nitrate or various astringents, combined with opiates if the pain is intense.

Summary of Treatment.—Following are the salient points in treatment:

1. All affected parts—urethra, genital tract, rectum—must be treated simultaneously so as to prevent reinfection from one to the other.

2. Urethral gonorrhea should be treated energetically from the very beginning. Cervical gonorrhea, in the acute stage, responds kindly to general measures while in the chronic stage local treatment is in order. Ascending gonorrhea of the internal genitals requires painstaking efforts to check the *first* attack and to prevent a recrudescence of the pathologic process.

3. None of the multitudinous methods is certain of success. As a rule, several methods must be used in combination, and very often the practitioner is forced to change methods.

4. To carry his treatment to success in a certain percentage of his cases, the practitioner must be willing to bear disappointments and to persevere in his efforts.

5. Another essential premise is an intelligent coöperation on the part of the patient and, if she is married, her husband. Sexual intercourse is strictly interdicted during the course of the treatment.

6. The curet has no place whatever in the treatment of gonorrhea.

WHEN MAY WE PRONOUNCE A CASE CURED?

The fading away of outward signs of inflammation, the disappearance of macroscopically abnormal discharges, and even the occasional absence of gonococci in smears are not sufficient. *It is an indispensable postulate that the secretions remain permanently free from gonococci.* This means that smears must be examined at certain intervals and after "provocatory" measures. The chief means of provocation are: (1) menstruation; (2) hot sitz bath; (3) injection into the urethra and cervical canal of a 5 to 10 per cent silver nitrate

solution; (4) subcutaneous injection of fifty to one hundred million of gonococci vaccine; (5) sexual intercourse (with condom).

From twelve to twenty-four hours after one or more of these provocatory tests a microscopic examination is made. It is important to procure smears from the various recesses where experience teaches us gonococci may lie hidden for long periods of time. The following hints may be useful in obtaining the desired material:

Urethra—the patient must not void urine for several hours prior to examination. The urethral opening is first cleansed with a moist swab. The urethra is then massaged, from behind forward, through the anterior vaginal wall, particular attention being given to "milking" the ducts of Skene on either side near the meatus. A smear is made with a platinum loop (not a swab) both from the urethral canal and the ducts. It is better sometimes to scrape the urethral mucosa with a small, dull spoon, particularly if the secretion is very scant (Fig. 53).

Bartholin's Glands—these glands should be gently squeezed between thumb and index finger and the ducts massaged toward their orifices. If no secretion can be obtained, a very fine metal probe is introduced from 1 to 1½ cm., if necessary with the help of a magnifying glass. There will be enough secretion on the probe to make a microscopic examination.

Cervix—expose this in a speculum, cleanse the external os of all mucus with a swab soaked in a solution of bicarbonate of soda, and introduce the platinum loop into the cervix; or apply a Bier suction cup to the cervix for three minutes, draw up the secretion, expel this into a normal saline solution, put the mixture into a centrifuge, and make a smear from the sediment. A suction cup may be improvised with a tubular speculum, the opening of which is closed with a perforated rubber stopper.

The smears are then stained with Loeffler's methylene blue solution and, if doubtful, with Gram's stain or any of its modifications. In studying the slides, those portions should be carefully investigated where there are any leukocytes; here, if at all, cocci would be found. Their intracellular location decides the question. Only positive results count. Negative findings do not mean much, unless a number of negative smears have been obtained in succession. Authors differ as to the number of such smears. The decision is somewhat arbitrary. My own rule is this: four consecutive smears at weekly intervals must be negative; one of these is made soon after menstruation. A fifth smear is made after provocation with silver nitrate. During the following four weeks sexual intercourse, with *condom,* is permitted and then a sixth smear is made. If all these have been negative, I pronounce the patient cured.

The complement-fixation test, which is similar to the Wassermann reaction in syphilis, is not well suited for general practice. Moreover, the authorities on the subject seem to regard it of value more in metastatic infection of the joints, heart, etc., than in the localized lesions of urethra and cervix.

Where the secretions prove negative but there are old remnants of the infection in the tubes, ovaries, or pelvic peritoneum, we may say, *tentatively,* that the patient is cured if no disturbances occur after strenuous exercises or exertions.

Sometimes recrudescences of the disease are observed months and even years after the patient has been adjudged cured. The physician should bear this in mind and suggest bacteriologic control examinations from time to time. Finally, the possibility of a reinfection must not be left out of consideration.

SEPSIS

The vulva and vagina normally harbor a multitude of microbes of all kinds, notably the streptococcus, staphylococcus, and bacterium coli variety, which have become acclimated and assume the rôle of harmless parasites. Even pathogenic or septic germs introduced from without cannot live in the normal vagina or, if they survive, are rendered innocuous. This is probably due to the acid reaction of the vaginal secretion which is produced by the action of the bacillus of Doederlein. But there remains in all these germs a latent power to cause disease which manifests itself if the local resistance of the genital tract is lowered. This occurs most frequently as a result of traumatisms to which women are preëminently exposed during the reproductive age and particularly in parturition.

Puerperal infections, therefore, form the bulk of septic diseases and these are dealt with in detail in textbooks on obstetrics. "From an acute puerperal septic infection, few if any women ever make a complete recovery. Even if, as is rarely the case, no pelvic or abdominal lesion is left behind, the general powers of resistance to disease and nerve-strain remain permanently weakened. From subacute and chronic puerperal infections there is an enormous toll in the form of chronic pelvic disease and consequent invalidism. Even from puerperal infections, so mild at the time as hardly to cause any elevation of temperature, there arise, later, a vast number of cases of minor chronic pelvic troubles—sterility, repeated abortion, pain." (Johnstone.)

These cases of chronic pelvic disease are the ones we meet in gynecologic practice and have to discuss in this section.

Second in order of frequency are septic infections caused by the physician in introducing a uterine sound, performing a curettage, or practicing other forms of intra-uterine treatment.

Finally, attempts at abortion on the pregnant or presumably pregnant uterus, made by abortionists or the patients themselves, are frequently a source of septic infections. The treatment of this group coincides with the treatment of acute puerperal infections and may be studied in obstetrical books. In this section, as has been mentioned, we are concerned only with chronic septic infections.

Uterus.—The chronic infection or inflammation of the uterus affects, as a rule, all parts of it. In most cases it is the legacy of an acute puerperal (or gonorrheal) infection. When that infection first took place, an inflammation, with hypertrophy of the stroma cells and leukocytic infiltration, established itself in the endometrium and progressed by way of lymph-vessels and blood-vessels into the myometrium. By the time we see the

case in a chronic stage, these obvious signs of inflammation have disappeared, but there remains a lasting increase of connective tissue in the uterine wall at the expense of its muscular elements and, in many instances, an enlargement and rigidity of the uterine body. Here and there, nests of round cell infiltration persist for an indefinite time. The endometrium, too, may remain thickened on account of the increase of the interstitial cells. The leukocytic infiltration and the causative microbes have disappeared by then, but an unusually large number of plasma cells testifies to the fact of a previous infection. The uterine glands have not been affected. In former years, any thickened mucosa was supposed to be the result of endometritis, and any appreciable increase in the size or number of glands was termed, respectively, a hypertrophic or hyperplastic endometritis.

To-day we know, thanks to the fundamental researches of Hitschmann and Adler, that such changes in the uterine glands have nothing to do with inflammation. These authors have demonstrated that the uterine mucosa undergoes constant changes which express themselves chiefly in the behavior of the glands and reach their maximum intensity in the ten days prior to menstruation. A thickened mucosa examined at that time may, therefore, merely represent the physiologic premenstrual swelling. The microscopic differentiation between this physiologic and any abnormal thickening of the mucosa is well-nigh impossible at this stage. If, however, the mucosa should exhibit an increase in number and size of glands in the ten or fourteen days *following* menstruation, the condition must be considered pathologic, but—and this is a very important point—the change is not due to any acute or chronic inflammation of the endometrium. It is due either to a hyperfunction of the ovaries or some other disturbance in the equilibrium of the endocrine glands. We should, therefore, in such cases, do away with the terms of hypertrophic or hyperplastic endometritis which denote inflammation, and substitute for them the terms of hypertrophy or hyperplasia of the endometrium, respectively.

This digression was necessary in order to explain the fact that in many uteri which are the seat of a true chronic inflammation, the endometrium is not materially thickened. For the same reason, uterine discharge is by no means a regular symptom of chronic endometritis; if present, it is thin and serous in nature.

The cervix, on the other hand, usually shows very marked signs of chronic infection. It is large, thick, and hard. Beneath its mucous covering, small grayish or yellowish vesicles project, which, on being punctured, emit mucus; these are the so-called nabothian follicles, retention cysts of cervical glands, the ducts of which have become occluded (Fig. 54). Around the external os, but sometimes only on the anterior or posterior lip, there is often a so-called erosion, a highly reddened, glistening, at times slightly bleeding area, where the squamous-cell covering has been transformed into the cylindrical epithelium of the cervical canal (Fig. 55). The glands of the cervical canal are very active and produce a great deal of glary or purulent mucus.

The symptoms of chronic inflammation of the uterus are not very characteristic. There is usually a sense of fullness and an indistinct soreness in the

lower abdomen and a slight backache, caused in part by the increased size and weight of the uterus, but to a greater part by extension of the condition to the neighborhood of which we shall have to speak presently. As exertions increase the discomfort, the patients lean to a general lassitude and become generally depressed. The menses are more profuse and last longer than normally, probably not so much because of any local changes as that the ovaries, too, have become affected and overstimulated. The vaginal discharge is annoying and irritates the vulva; and, finally, sterility ensues.

As to treatment, we are dealing here only with the chronic cases in which fever has long disappeared. We may, therefore, proceed at once to local

FIG. 54.—THE GRAYISH OR YELLOWISH ELEVATIONS UPON THE CERVIX WHICH REPRESENT RETENTION CYSTS OF CERVICAL GLANDS, THE SO-CALLED NABOTHIAN FOLLICLES, ARE INDICATIVE OF A CHRONIC ENDOCERVICITIS (redrawn from Berkeley and Bonney).

treatment, though we can never be sure that the old process may not break out unexpectedly.

The treatment in vogue is curettage, but, in unison with many recent writers, I have seen more harm than good come from the use of the curet. It is difficult to understand why the removal of the uterine mucosa, which is only a part of the diseased organ, should remedy the condition, and, as a matter of fact, the number of patients cured by curettage is negligible. Moreover, the operation leaves a large wound behind, which may readily become reinfected.

My preferred treatment is this:

1. The uterine cavity is wiped out two or three times a week cautiously with thin cotton applicators dipped in pure ichthyol.

2. The nabothian follicles are opened with the pointed nasal electrocautery and the cervical canal is cauterized in the same way. This is done once a month.

3. As long as there is discharge, the vagina is filled with kaolin to absorb the moisture and give the erosion a chance to heal. This is done at first daily, later every two or three days.

4. Every two or three days a cleansing douche is taken.

More recently I have been using equal parts of kaolin and bicarbonate of soda. Any remnant of the powder is merely wiped out at the next treatment. When the treatment is given only every two or three days, the vagina is

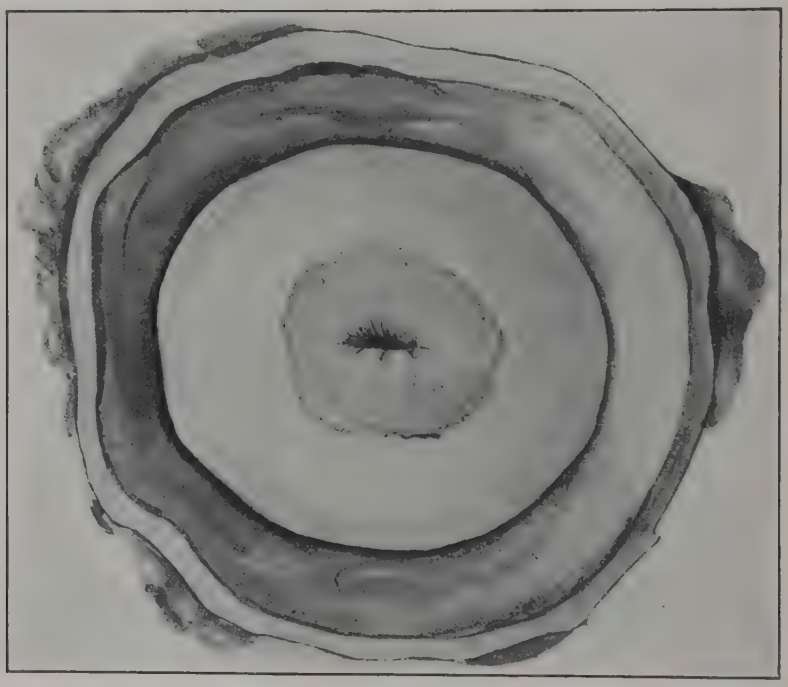


FIG. 55.—AN EROSION. This is caused by an extension of the inflammatory process in the cervical mucosa to the outer surface (redrawn from Berkeley and Bonney).

usually found to be free from powder, so that vaginal douches are superfluous. I see a great advantage in the restriction of vaginal douches. Few women observe the necessary cleanliness, even if properly instructed, and there is an ever recurring chance of introducing fresh germs into the vagina.

5. Attention is paid to the general health and in particular to regulation of the bowels.

Parametrium.—Loose, cellular connective tissue surrounds the organs within the pelvic cavity (bladder, uterus, rectum), and fills the space between the peritoneum above and the pelvic floor muscles below. This pelvic connective tissue serves as support to blood-vessels and lymph-vessels, nerves, and muscle fibers. It is largest in amount on either side of the uterus, between the layers of the broad ligaments, but there is also considerable connective

tissue behind the uterus and beneath the folds of the uterorectal peritoneum.

The inflammation of the pelvic cellular tissue is called parametritis and is caused by the invasion of microörganisms, chiefly streptococci and staphylococci. The time of infection is, in the main, the puerperium, when the germs find a port of entrance in cervical tears. Unclean examinations or instrumental manipulations outside the puerperium are a much rarer source of infection. Having once entered, the microbes find, in the softened and succulent connective tissue, the most favorable conditions for rapid growth. The result is a phlegmon in the meshes of the connective tissue characterized by a serogelatinous, yellow exudate, which forms a soft elastic swelling with indis-

FIG. 56.—A PARAMETRIC EXUDATE MAY FILL THE ENTIRE PELVIS CELLULAR TISSUE FROM THE PERITONEUM TO THE PELVIC FLOOR. It is always intimately connected with the uterus and spreads out fan-shaped toward the pelvic wall (redrawn from Jaschke–Pankow).

tinct contours. The prevention and treatment of this acute parametritis, which often terminates in suppuration, lies in the field of obstetrics.

In gynecologic practice we meet the condition only in a more or less chronic stage, when the surrounding edema has been absorbed and the exudate has coagulated. There is now a hard tumor present which persists for a long time and, by further inspissation, becomes progressively harder. The size of the tumor depends on the degree of extension. It may be small, flat, and limited to the immediate vicinity of the uterus, or it may be massive and fill the entire space to the pelvic bones (Fig. 56). It may extend forward and involve the connective tissue around the bladder (paracystitis), or backward towards the rectum (paraproctitis). The process may be limited to one side or it may fill the entire pelvic cavity. In every case it is intimately connected with the uterus. Under favorable circumstances, it may be absorbed completely, but more often sclerotic portions remain, which shrink and lead to dis-

location of the uterus. Occasionally, the process flares up again, even after the chronic stage has been reached, and a new extension takes place. The fresh exudate may undergo the retrogressive changes just described, or suppuration may occur here and there, and the resulting small abscesses merge into a larger accumulation of pus which seeks its way outward.

Rise of temperature and increased pulse rate, occasionally a chill, pain in the lower abdomen, and more or less marked meteorism belong to the picture of acute parametritis. In the chronic stage, there is often a very distressing dull ache in the pelvis and back which plays havoc with the nervous system, and, not infrequently, there are signs of peritoneal irritation and disturbed peristalsis; if the rectum has been surrounded by exudative masses, a mucous proctitis may result. All symptoms are exaggerated in the presence of pus.

The *diagnosis* is usually simple and is based upon the findings of an infiltration of the broad ligament or other sections of the parametrium. Recto-abdominal palpation is here of signal value. There is always a close connection with the uterus and a fan-shaped broadening out towards the periphery. The consistence is hard, occasionally fluctuating. The tumor is usually immovable and pushes the uterus towards the free side. In extensive cases, the pelvic cavity is completely cemented, as it were, and no details can be elicited. The lower surface is irregular, the upper usually smooth.

In the differential diagnosis, pyosalpinx, perimetritic exudates, tubal pregnancy with hematocele, appendical exudate, and intraligamentous fibroids must be taken into consideration.

The *therapy* depends on the condition of the exudate and the length of time since the infection. As long as there is fever, absolute rest in bed is necessary. An ice-bag on the abdomen or, on the contrary, warm, moist compresses relieve the pain; yet, narcotics in the form of suppositories cannot always be avoided. Fresh air, easily digestible food, and plenty of water increase the general resistance.

Long-continued fever suggests suppuration, and pus requires evacuation, but only when marked fluctuation clearly indicates the location of the abscess. The method of incision and drainage belongs to operative gynecology and may here be omitted. I must, however, refer to two personal observations where I have succeeded with injections of milk (Chapter XXI) in bringing a large fluctuating parametric abscess to complete absorption. A trial, therefore, with protein therapy is advisable before surgical treatment is instituted.

A parametric exudate in the chronic stage and in the absence of fever calls for measures to induce quicker absorption. This is done by means of heat: hot compresses on the abdomen, protracted hot douches, dry heat, or sitz baths. The patients must be watched carefully and the applications regulated according to the reaction. Diathermy has recently been employed with good results, as I infer from the literature. A very useful mode of producing active hyperemia is the pressure treatment which, on the whole, is preferable to bimanual massage (Chapter XIX). As an adjunct to both heat and pressure treatment, ichthyol-glycerine tampons are applied every two or three days. To further absorption, Rheinstaedter gives enemas containing potas-

sium iodid 0.1 (gr. 1½) every day for weeks until iodism occurs. Pulvermacher uses tincture of iodin in enemas of warm liquid paraffin.

A visit to watering places is often of great value. Hot springs or mud baths are particularly to be recommended, but care must be taken not to overtax the strength of the patient.

Where cicatricial shrinking of rests of exudates has taken place, all these measures are apt to fail and one may be forced to perform a hysterectomy as a last resort, without, however, being certain of complete relief of the complaints.

Perimetrium.—The inflammation of the peritoneum of the pelvis is called perimetritis or pelvic peritonitis. Usually as a result of infection in labor or abortion, but also after dirty instrumentation or perforation of the uterus, the bacteria—mostly streptococci, less often staphylococci and colon bacilli—invade the pelvic peritoneum through the uterine wall. We have to distinguish this septic perimetritis from the pelvic peritonitis in the train of gonorrheal or tuberculous infection which is discussed in separate chapters.

Septic perimetritis may also be caused by an extension of a parametric infection; or an appendical inflammation may progress downward into the pelvic cavity. Finally, though not often, the streptococci always present in large numbers in cancerous tumors of the cervix, may pervade the tissues into the peritoneum, and I have reported a unique case of necrotic gumma of the cervix where the same complication occurred.

Once implanted in the pelvic cavity, the microbes set up an intense inflammation which may take on one of two forms.

In the *exudative* perimetritis, the normally grayish and shiny peritoneum is highly reddened, cloudy, and covered with fibrinous or fibropurulent masses which glue the organs and intestinal loops in the pelvis together. Small abscesses form in the spaces between adherent parts; larger accumulations of pus, following the law of gravity, find their way into the pouch of Douglas. The pus contains enormous quantities of cocci. The abscesses either break through into one of the neighboring organs, or the pus is gradually absorbed, the cocci disappear, and massive adhesions and pseudomembranes are left behind. Tubes and ovaries are always involved. Being enveloped and irritated at first only on the outside (perisalpingitis, perioöphoritis), they may not always escape the invasion of microbes into deeper layers with consecutive formation of pyosalpinx and pyovarium. In favorable cases, the process remains limited to the pelvic cavity, intestines and omentum forming a protecting roof over the area of inflammation, but great virulence of the microbes and lowered resistance of the body may enable the infection to involve the abdominal cavity and set up a general peritonitis.

In the *adhesive* form there is no free pus. The process is one of intense new formation of connective tissue which is often well vascularized and surrounds and connects all pelvic organs and tissues with numerous adhesions. These adhesions vary from the thinness of cobwebs to tendonlike hardness, from short bands to extensive sheets. The shrinking of these adhesions dislocates the organs to which they are attached. Thus the uterus is often pulled backward and "fixed" in the culdesac. The tubes may be kinked so that eventu-

ally an ectopic pregnancy may be the result. The ovaries may be so completely covered over that the follicles cannot burst and sterility must ensue. The top of the bladder may be pulled up on the fundus of the uterus, and intestines may be distorted in the most bizarre fashion.

The most important subjective symptom of perimetritis is pain. It is very intense in the exudative form and associated with distention and rigidity of the abdomen, nausea, and vomiting. This triad of symptoms distinguishes the perimetritis from parametritis. The pulse remains fairly normal and becomes fast only if the inflammation is very extensive and begins to involve the abdominal peritoneum.

In the adhesive form, the pain is not quite so excruciating, but it is constant. Not only does every movement of the body hurt, but the filling and emptying of the bladder and rectum, menstruation, sexual intercourse, in fact, every function of the organs in the pelvic cavity causes pain. Adherent intestines and omentum produce gastro-intestinal symptoms, and the general condition of the patient may become deplorable.

The diagnosis of the exudative perimetritis is based on the presence of a soft mass behind the uterus, which pushes the posterior fornix downward and the uterus towards the symphysis. Fluctuation is not always marked, but fever and hyperleukocytosis are present. The upper pole of the mass, composed as it is of adherent bowel, is very indistinct. Differentiation from an appendical abscess is no less difficult than from a parametric exudate.

In adhesive perimetritis, the dislocation and immobilization of the various organs, principally the uterus, are of diagnostic importance. An attempt to lift the uterus causes pain in the rectum. The adhesions themselves cannot easily be felt, unless they are in the culdesac just above the posterior vaginal fornix. Not infrequently the experienced examiner feels an adherent intestinal loop, which does not change its position, if the pelvis is raised. Rectal examination is of considerable help. In difficult cases, the patient may have to be examined in narcosis. The use of X-ray photography, finally, with or without an artificial pneumoperitoneum, may help to clear up a doubtful case.

All examinations, however, must be made very gently, lest harm be done by brusquely tearing adhesions in the dark or stirring up a chronic process to new acuteness. This tendency to recurrences is very marked, and as there is always a possibility of even a late extension of an exudative perimetritis to the general peritoneal cavity, our prognosis must be guarded.

The treatment of acute exudative perimetritis consists of rest in bed, ice-bag, opium, and restricted diet. In the subacute stage, that is, two or three weeks after infection, the protein therapy, to my mind, offers the best chances for recovery (Chapter XXI). The following two cases may serve as illustrations:

Mrs. A.—Curettage five weeks after delivery for hemorrhages due to retained placental tissue. Perforation of uterus into culdesac with the curet, recognized immediately. Three days later, an abscess began to form which in the next ten days extended upward to the umbilicus and bulged deeply downward into the vagina. Fluctuation marked. High fever (103°) and leukocytosis of 24,000. Patient on operating table, ready for vaginal incision and

drainage, when I suggested protein therapy. *Five injections of milk cured this patient of every vestige of the abscess within eighteen days.*

Mrs. B. had introduced a tent of slippery elm, in the erroneous belief that she was pregnant. Large, fluctuating mass behind the uterus pushing fornix downward. Hyperpyrexia and hyperleukocytosis. Advised to undergo operation. *Eight injections of milk brought about complete restitution in three weeks.*

In these two cases no additional treatment, save a strengthening diet, was given. As a rule, however, local absorbent measures (moist compresses on the abdomen, hot protracted douches, dry heat, etc.) may hasten the recovery. Since adopting the protein therapy, I have had no occasion to resort to vaginal incision and drainage, though I realize that this operation may at times be indicated.

Residues of a previous perimetritis, in the form of thick, hard, and indolent swellings behind the uterus, are best treated with the mercury colpeurynter (Chapter XIX) and protracted hot douches.

The treatment of adhesive perimetritis is entirely different. I have never been able to bring about an absorption of adhesions by any local treatment. Only if the adhesions are in the culdesac is the mercury colpeurynter of value, that is to say, it brings subjective relief, without doing more than stretching the adhesions. Protein therapy is unsuccessful in these cases. Gynecologic massage is inadvisable. The freeing of a fixed uterus by this method is more than doubtful and the strong friction required is apt to cause exudates from the already irritated peritoneum. Hot baths and sitz baths, visits to watering places, much physical exercise (golf, tennis, etc.) may in time result in a measure of subjective relief. Where the distress persists, a laparotomy is indicated to sever the adhesions and cover the raw surfaces with peritoneum. Even then, the result is not always perfect.

SYPHILIS

In 1905, Schaudinn and Hoffmann discovered a spirillum, to which they gave the name of Spirochaeta pallida, as the cause of syphilis. Unlike the gonococcus, this organism requires a port of entrance to produce infection, but as syphilis of the female genital tract is caused almost altogether by direct contact in sexual intercourse, minute local lesions or abrasions of the surface epithelium are not wanting where the spirocheta may penetrate into the tissues.

At the point of entrance, the slowly growing parasite produces a reaction on the part of the endothelial and connective tissue elements which expresses itself in the formation of so-called granulation tissue composed, in the main, of an accumulation of lymphocytes and plasma cells. Within this granulation tissue there are many newly formed capillaries, the endothelium of which is swollen and proliferated so that the lumen is narrowed or altogether occluded; in larger blood-vessels with an external coat, the latter increases in thickness. At first sharply defined, this accumulation of granulation tissue gradually

spreads out into the surrounding corium. Spirochetes are present in fairly large numbers in the infiltrated area.

The process just described in brief outline is finished about three weeks after exposure and now becomes visible to the naked eye in the form of a small, round, and slightly elevated papule of a reddish-brown color. This is the so-called *primary* lesion. It is also called hard chancre or initial sclerosis because the papule is rather firm to the touch and has beneath, as its base, a thin disk of characteristic hardness which has been likened to that of parchment or cartilage. The surface of the papule very soon exhibits a central depression, the result of necrosis, and the covering epidermis undergoes atrophy and ulceration. Instead of a papule, the primary lesion occasionally takes the form of an irregular erosion with a shallow, moist base which is surrounded by a rather extensive and firm indurative edema.

The chancre may make its appearance in the vulva, on the vaginal wall, or on the cervix. If it occurs in the vulva, the favorite site is the major lip; next in frequency the minor lip near the prepuce of the clitoris is affected. I found the initial lesion once on a protruding hemorrhoid. Of certain peculiarities of the primary lesion, more will be said later.

Primary chancre in the vagina is rare. It either presents a reddish-brown glistening surface which secretes a scanty amount of serous fluid, or it is covered with a thin yellowish or whitish film, a pseudomembrane which adheres firmly to the base. It is usually located on the posterior wall near the cervix and produces neither pain nor vaginal discharge. Upon the cervix the chancre represents a more or less deep, funnel-shaped sore with thickened, rounded edges which slope down to a smooth, dry floor of a glistening, varnished appearance. The appearance of the lesion changes rather rapidly from day to day, but there is one characteristic feature which is never quite absent: a peculiar yellowish or fatty luster with here and there small hemorrhagic spots. The cervix itself is usually thickened by an infiltrating edema.

The superficial inguinal and femoral glands become palpable as small, shotlike, hard, and indolent bodies, a week or two after the chancre if the latter is located in the vulva. This induration is absent if the chancre is in the vagina or on the cervix.

The diagnosis in this stage depends (1) on the history of exposure about three weeks previously, (2) on the physical characteristics of the sore, (3) on the presence of indurated glands, (4) on the microscopic demonstration of the spirochetes by dark-field illumination or other special methods. The technic required is here omitted as it lies in the field of the laboratory specialist. The practitioner, however, should know how to obtain a specimen for examination. The surface of the chancre is carefully cleansed with normal saline solution and then dried. No antiseptic solution must be used for forty-eight hours prior to the test. The sore, if readily accessible, is gently squeezed between the gloved fingers until a serous exudation appears, of which a drop is used for examination. Sometimes a small Bier's suction cup is preferable.

In this primary state of syphilis, the Wassermann test is negative. In the differential diagnosis of the primary lesion of the cervix, papillary or follicular erosions, which bleed easily and have ill-defined contours and a finely granular

surface, or beginning cancers must be excluded; the latter may require an exploratory excision.

Three or four weeks after the first appearance of the chancre, the secondary cutaneous manifestations of syphilis will appear in various parts of the body. Simultaneously the Wassermann test becomes positive. As far as the genital tract is concerned, the most important lesions are the condylomata lata, flat, warty growths of a dirty white or livid color and with a moist surface in which the spirochetes are found in very large numbers. These warts usually commence around the anus and spread forwards. They frequently fuse together, covering a large area and even forming cauliflower growths with fissures and ulcerations. They must be distinguished from the condylomata acuminata which often follow a gonorrheal infection; the latter are pedunculated and their surface is usually dry.

There are further "mucous patches" on the inner surfaces of the vulva, that is, areas of superficial epithelial necrosis which, becoming abraded, produce superficial ulcers.

In the vagina and, more often, on the cervix, there are also macules, irregular bright red efflorescences which are not raised above the surrounding healthy mucosa. According to my experience, they represent remnants of healing ulcers; at times they correspond to the macular syphilids of the skin. These, as well as papules which may also be seen in this locality, have no symptoms of their own and, therefore, are discovered only accidentally during an examination with the speculum.

Late, so-called tertiary manifestations occur about the vulva in the form of gummata. These are either hypertrophic vegetations, sometimes of imposing size and covering a large part of the outer genitals, or they represent more or less extensive ulcers, deeply excavated, with sharply defined and undermined edges, and a glistening or necrotic base. *Both* processes are usually associated. From carcinoma, these gummata are differentiated (1) by their more defined outline, (2) the hard areas of unbroken-down tissue covered with healthy epithelium, (3) the indolent character of the ulcerations as contrasted to their destructiveness. Evidences of syphilis elsewhere, the Wassermann test, microscopic examination of excised pieces of tissue, and the effect of antisyphilitic treatment are further aids in diagnosis.

All this refers more or less also to tertiary luetic manifestations in the vagina as these represent, as a rule, the continuation of gummatous processes which had started from the vulva. If the upper third of the vagina is involved, the point of origin is on the cervix. The vaginal gummata very often lead to constrictions and fistulae. I have described elsewhere a case of this sort in pregnancy, where the lower vaginal tube was almost obliterated by gummatous masses and cesarean section became necessary. Rectal strictures are present in many cases. Tuberculosis can be ruled out without much difficulty; if there be doubt, the effect of specific treatment should be tried.

Tertiary lesions of the cervix are much more frequent than is generally assumed. The essential form is that of a gumma (Fig. 57) which, in the majority of instances, undergoes necrosis and ulceration. If the tissue proliferation predominates, we speak of gumma; if retrogressive changes prevail,

we speak of tertiary or gummatous ulcer. The process may involve the vagina or extend into the cervical canal and is frequently associated with similar lesions elsewhere. The consistence is firm but becomes soft under the influence of tissue necrosis. The most characteristic color is yellow, though various other shades may be observed. Bleeding or profuse mucopurulent discharge is present in most cases, but no pain. These lesions, which may heal spontaneously with the formation of scar tissue, disappear, as a rule, very quickly when specific treatment is instituted.

Cervical gumma is most often confused with cervical carcinoma. In the differential diagnosis, the outcome of the Wassermann reaction is inconclusive. Carcinoma may well exist in a Wassermann positive patient.

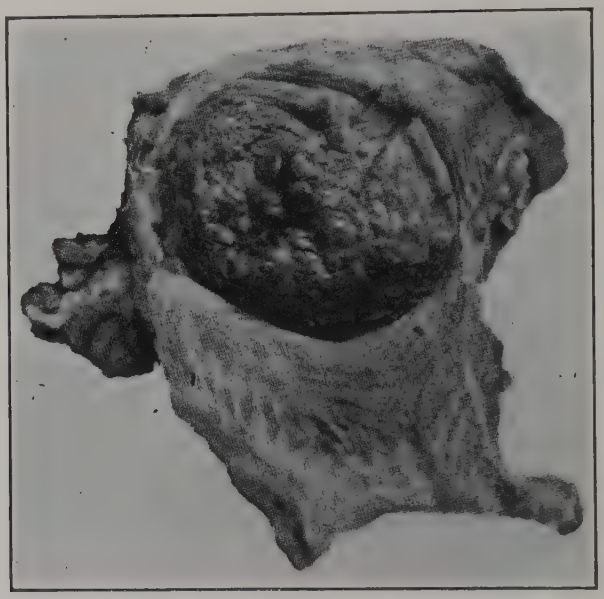


FIG. 57.—GUMMA OF THE CERVIX. The voluminous tumor bears a close resemblance to carcinoma and the proper differentiation often requires microscopic examination (case of Gellhorn and Ehrenfest, *Am. Journ. Obst.*, 1916).

The microscopic examination of excised tissue likewise leaves room for doubt at times, and the literature contains a number of mistakes in either direction. The general condition supplies no decisive answer; syphilitic as well as cancerous women may be cachectic. To my mind, the most important feature is the consistence. In a carcinoma, though it may appear very hard at first, the finger can always break into the tissues; this is impossible in a gumma even though its original firmness may have been softened by necrosis. A trial of two weeks of antisyphilitic treatment will appreciably reduce the size of the gumma and have no effect on a carcinoma. A suspicious ulcer or growth on the cervix which is at some distance from the external os is almost certainly syphilitic.

From tuberculosis of the cervix the gumma may be differentiated by the absence of tubercles in the neighborhood, the lack of tenderness to touch, and

the freedom from tuberculous foci in other parts of the body. Microscopic examination, of course, should not be omitted.

Syphilis of the uterine body, the tubes and the ovaries is too rare and too indefinite in its physical signs to be discussed here. The reader will find a full presentation of the subject in the paper by Gellhorn and Ehrenfest.

This concludes the enumeration of the *outward* manifestations of syphilis in the genital organs from the point of view of general practice. It exhausts by no means the problem in hand, and the following points demand the very earnest attention of the practitioner:

1. There are several very marked differences of the disease in the two sexes. The classical signs with which we have become familiar from thousandfold observations on the male will be found wanting or considerably modified in the majority of our women patients. While in men, the initial lesion is usually noticed by the patient and found by the physician without any difficulty, and while in men the primary sore leaves unmistakable traces behind which may persist for a long time, the opposite is true in women. The difficulty of demonstrating a hard chancre in women is due to two factors. The female genitalia being more complex than the male, the sore might be established in some concealed location and thus escape discovery, notwithstanding the fact that in women the initial lesion is very often multiple. The chancre in women is smaller than in men. Only if situated on cutaneous surfaces about the genitals does it present the typical induration. Upon the genital mucous membranes the parchmentlike induration of the base is absent or can only very occasionally be elicited. Furthermore, the primary lesion clears up more rapidly in women than in men. The ephemeral nature of the primary lesion in women is so pronounced that, to speak with Shillitoe, in a marked case of secondary syphilis, a medical man need have no doubt as to the correctness of his diagnosis because he has failed to discover the original sore.

The transient nature of syphilitic affections of the genital mucosae in women seems to prevail throughout the course of the disease, and even deep ulcerative syphilides of the cervix leave, as a rule, no scars as typical as those of syphilitic ulcerations in other mucous membranes. Mucous patches in the oral cavity occur probably as frequently in women as in men, but the comparative absence of chemical irritation due to smoking and drinking favors a more rapid limitation and complete resolution of these luetic manifestations in the majority of female patients. Cutaneous eruptions are likewise milder and more fleeting in women. The only notable exception is found in the so-called collar of Venus or leukoderma cervicis. These white spots, which are irregularly distributed over the neck, represent remnants of an annular syphiloderm and persist in women for so long a time and in such pronounced form that they may safely be regarded as pathognostic (Fig. 58).

2. The general health may be little affected during the eruptive stage of the disease; a man may present a well marked eruption and yet feel perfectly well. For some reason which cannot yet be explained, the female sex in some respects seems to suffer more than the male. Fever and anemia are commoner in women than in men, and an obscure cachexia in a younger woman should make us suspect syphilis as the underlying cause. Very often, however, there

are no outward signs to guide us in our clinical diagnosis, neither are there any suggestive points in the history of the case, and it was left to the systematic employment of the Wassermann test to establish the fact that the so-called latent syphilis is considerably more frequent in women than in men.

This discovery has very materially altered our conceptions regarding the frequency of syphilis in women in general. We know now that the disease is *extremely common* in women, a fact which the physician should always bear

FIG. 58.—LEUKODERMA CERVICIS. The white spots in the skin of the neck are remnants of old eruptions and pathognostic of syphilis (from the collection of the Barnard Free Skin and Cancer Hospital).

in mind. In this connection I wish to cite a personal observation which will bring out several points of practical importance.

A highly refined woman of twenty-six consulted me on account of her sterility. There were no special complaints, and the history, at first, was entirely negative. The gynecologic examination failed to furnish any clews, but on careful general examination the nuchal glands and one epitrochlear gland were found enlarged. Tactful questioning now brought to light the fact that she had acquired syphilis soon after her marriage five years previously and had received vigorous treatment for more than a year. She had since had no symptoms whatever and considered herself entirely cured.

Wassermann was negative. I lost sight of the patient for more than a year, when she returned, again because of her sterility. On speculum examination I now found upon the posterior aspect of the cervix and a short distance from the external os a diffuse and somewhat puffy area of whitish discoloration. A week later two typical syphilitic ulcers appeared in this leukoplakic zone; their color was of a yellowish luster with a red undertone, the irregular outline was surrounded by a fine red line. In another week these ulcers had healed completely; in their stead there was a diffuse area of bright red which decreased from day to day. Wassermann was again negative, but I have the patient now under specific treatment.

This case clearly illustrates the diagnostic difficulties in latent syphilis. Only a careful general examination furnished meager though decisive information. The appearance of typical luetic lesions upon the cervix clinched the diagnosis. At the same time, the fleeting nature of these lesions was impressive and showed how readily they may be overlooked.

3. The frequent latency of syphilis probably accounts for the fact that women, as a rule, receive but incomplete treatment. The value of the Wassermann test is inestimable, but it has its limitations as is so well shown in the case just cited. A positive Wassermann, of course, is proof of the disease, but a negative reaction does not prove the contrary. We may try a "provocative" Wassermann by giving the patient mercury internally for ten days, but even then a negative outcome is valueless as long as adenopathies or other clinical signs of syphilis persist.

4. If syphilis in women were always adequately treated, the question, When may a syphilitic marry? could be answered more readily.

Pollitzer says that she may marry without risk of infecting her husband as soon as she has passed the stage of active infectious lesions of the skin and mucosae, in general, even by the old methods of treatment, two or three years after infection; but she cannot bear children without the risk of bearing syphilitic children until she has become permanently Wassermann negative.

Thompson quotes Keyes to the effect that in the female five years is little enough time and that more would be better. Thompson himself, Morton, and the majority of writers feel that permission to marry should not be given unless the patient, after three years of treatment, shall have been clinically and serologically free from symptoms for at least a year.

5. A syphilitic lesion may turn into carcinoma. This fact is well known to surgeons, genito-urinary specialists, and dermatologists. Very little attention has been paid to this subject in the field of gynecology. Since Ehrenfest and I published our investigations in 1916, I have observed the direct transition of a gumma of the cervix into a malignant growth in three cases which were studied histologically and clinically for periods ranging from one to three years. All the more reason for the practitioner to institute energetic antisyphilitic treatment in all cases where he finds a luetic lesion in the genital organs. Syphilitics, says Horand, are potential candidates for cancer and live forever beneath a sword of Damocles. If a cancer occurs in a syphilitic subject, it will always seek the vulnerable spots which have already been marked by syphilis. Appropriate treatment, then, may interfere in time with

the threatening transformation into carcinoma. Thus may the statement of Bergh (quoted by Howitz) be interpreted that during the thirty-eight years in which he was in charge of a hospital for prostitutes he encountered only one case of cancer among them. This seems to indicate that thorough and repeated specific treatment of syphilis, such as these prostitutes received—nearly all having contracted syphilis early in their careers—may have a prophylactic action against the development of cancer later.

6. Syphilis may produce pronounced gynecologic symptoms even in the absence of any local lesions in the genital sphere. Chief among them are metrorrhagias. The voluminous literature on the subject has been considered in the article repeatedly referred to previously. The latest contribution is by Mouchotte. Metrorrhagias in a syphilitic woman do not signify a specific lesion in the ovaries. Rather does syphilis, by the infection of the entire organism, produce in some cases directly or indirectly disturbances in the *function* but not the tissue of the ovaries and these ovarian disturbances cause menstrual disturbances in the form of hemorrhages. The relation between syphilis and these hemorrhages is quite clearly proved in those cases which proved refractory to the customary modes of treatment but promptly ceased to bleed under specific treatment. The practical conclusion, therefore, is to try specific therapy before operative treatment is decided upon in all syphilitic women in whom a uterine hemorrhage is not definitely explained by local findings.

According to my experience which now extends over ten years, amenorrhea is even more frequent a sequel to syphilis than menorrhagia. In view of the cachexia and generally weakening effect which syphilis exerts on the female organism, this depression of the ovarian function is readily understood. The practitioner who bears this connection in mind will cure many of these patients by appropriate antisyphilitic treatment.

7. Syphilis may aggravate the symptoms of gynecologic affections. The interpretation of symptoms in a gynecologic patient is rendered more difficult by the presence of syphilis. Let us take for example the case of a retroflexion where the uterus is not enlarged, the menses not affected, the rectum and bladder not disturbed. This patient may complain of severe headache and backache. In view of the fact that syphilis often causes headache and backache, are we justified in ascribing these symptoms at once to the displacement of the uterus and instituting local treatment or recommending operation? Here, then, is room for critical judgment and a nice discrimination of the dignity of the general infection and the local disease in the production of the symptoms.

It has seemed necessary to me to discuss these various points in some detail because the question of syphilis in gynecology is of far-reaching practical importance, yet has received but very scanty attention in most of our textbooks and practically none by the profession at large.

Treatment.—As soon as the diagnosis of syphilis is made, treatment must be given as energetically as is compatible with the health of the patient. This treatment requires a minimum time of two or three years. It is not merely treatment of symptoms as they occur, but the necessity for carrying on

the treatment for long intervals without any outward signs of the disease, which forms the chief difficulty met with in both sexes, but, perhaps, more especially in women. We know well—wherever the opportunity occurs, it is our duty to impress this knowledge on patients—that the more thoroughly treatment is carried out during the first two or three years, the less will be their chances of being troubled in later life. Fournier and others have published statistics showing definitely that in by far the greater proportion of tertiary lesions, the patients had been inefficiently treated in the early stages. (Shillitoe.)

The full details of this specific therapy belong in textbooks on venereal diseases, and the reader will find suitable suggestions in the appended bibliography. In the Barnard Free Skin and Cancer Hospital where many of my clinical cases received treatment, we have followed the routine worked out by Weiss and Conrad. The "standard" course of treatment consists of three salvarsan injections one week apart and twenty injections of mercury bichlorid at two or three days' intervals (1 per cent $HgCl_2$, 2 per cent NaCl, C. P., in distilled water; dose 10 to 20 minims). The first seven injections are given prior to the first salvarsan injection, the rest between and following the salvarsan injections. Potassium iodid, or sodium iodid, is given to those patients who show evidence of localized lesions.

Routine in Primary Syphilis

Wassermann test.
Course I.
One month rest.
Wassermann test.
Course II.
One month rest.
Wassermann test.
Course III.
One month rest.
Wassermann test.

In secondary and tertiary syphilis more than three courses are required. There is no absolute rule as to how often this whole treatment has to be repeated. On an average, I prefer to subject the patient to it six times, but in late or refractory cases, this number may have to be doubled.

Considerable objection is often encountered on account of the painfulness of the deep mercury injections. In private practice I have repeatedly circumvented this difficulty by adopting the method of Bryant and Audry as recommended by D'Arcy Power who advocates the use of mercury suppositories.

℞ Ol. ciner. (gray oil).... 0.075 (which contains 0.03 of metallic mercury) (gr. $1\frac{1}{6}$)
Butyr. Cacao ..... 4.0 (ʒ 1)

One suppository is inserted every night for one month; then follows a break of four or five days after which the treatment is begun again.

While local lesions usually disappear promptly under a general antisyphilitic therapy, local treatment cannot entirely be dispensed with. In chancre of the cervix and in pregnancy, Shillitoe warmly recommends an ointment consisting of equal parts of lanolin and lard with 12 to 15 per cent of mercury (gray oil). Of this about three grams are applied daily to the cervix; in those cases in which daily application is either impossible or inconvenient, five grams are applied every second or third day. The preparation is kept in position by means of a carefully applied tampon, and in order to prevent this from absorbing the ointment it is necessary either to use non-absorbent cotton or to render the tampon impermeable by impregnating it with a mixture of two parts of glygerin to one part of tannin.

Ulcers about the vulva may be kept clean with iodoform or calomel powder. In large tumors around the vaginal opening, moist applications with a thin bichlorid solution (1: 3000) or astringent are in order. If the tumefactions do not decrease in spite of energetic general treatment, surgical removal may become necessary though the prospect of primary healing is not very promising.

CHANCROID

The chancroid or soft chancre is caused by an infection with the bacillus of Ducrey during coitus. Twenty-four hours after inoculation a red, hyperemic spot is noted which on the second day has become transformed into a nodule and on the third day into a pustule with a red surrounding areola. This subsequently breaks down and forms a sore with a crust covering the spot. (Morton.) The chancroid is usually located on one of the major lips, and as autoinoculation is common, two or more sores may be found on the opposite lip as well. The affected area presents all the characteristics of an acute inflammation—redness, swelling, heat, and pain. The ragged, punched-out appearance of the sores is characteristic; there is, further, a copious production of bloody, oftentimes ill-smelling pus, and a secondary infection of the inguinal glands leading to the formation of a bubo.

The microscopic demonstration of the bacilli is rather complicated; the very typical appearance of the soft chancre, however, obviates the need of staining tests.

The practitioner must always bear in mind the possibility of a "mixed sore" being present, that is to say, that an infection with syphilis may have taken place simultaneously. The clinical signs of the latter do not appear for three or four weeks; just about the time the soft chancre would have healed spontaneously, a hard chancre makes its appearance. This is a point of great practical importance. Personally I have not seen a simple soft chancre for years; in all of my cases, the typical induration at the base occurred in due time, followed later by secondaries. For this reason caution as to prognosis is always in order.

The principles of treatment, according to Morton are:

1. Cleanliness.
2. Antisepsis.
3. Rest.
4. Heat.

Cleanliness is best accomplished by frequent washing with solutions of bichlorid of mercury (1:5000), carbolic acid (2 per cent), or liquor aluminii acetatis (tablespoonful in a quart of water).

As to antisepsis, iodoform as a dusting powder has the greatest advantage. The unpleasant and tale-telling odor can be effectually disguised by using a 10 per cent solution in ether to which a few crystals of cumerine have been added (about gr. 1½ to the ounce). (Morton.) This solution is applied to the surface of the chancroid with a medicine dropper. Calomel is another serviceable dusting powder.

Heat is employed in the form of hot sitz baths or compresses.

After the acute stage has passed, the formation of granulations may be stimulated by means of silver nitrate (2 per cent) or the following salve:

℞ Argent. nitr..... 2.0 (gr. 36)
Balsam. Peruv..... 20.0 (℥ 6)
Vaselin alb.....ad. 200.0 (q.s. ad. ℥ 8)

The bubo which occurs in almost half of the cases requires separate discussion. Morton gives the following table of the differential diagnosis.

Differential Diagnosis of Bubo and Syphilitic Adenopathy

Chancroid (One side affected, as a rule)				Syphilis (Both sides affected)			
Shape	Size	Number	General Characteristics	Shape	Size	Number	General Characteristics
Irregular and boggy	Large	May be single	Considerable amount of inflammation, causing adherence to overlying skin. Generally suppurates Packet form	Regular, smooth and hard	Small	Always multiple and arranged in a chain	No inflammation. Not adherent to skin, but freely movable. Do not suppurate Rosary form

Treatment of Bubo.—1. Prevent suppuration, if possible, by rest in bed and warm applications with liquor aluminii acetatis. Sometimes, an ointment containing iodin is rubbed in gently with success.

Tinct. iodin..... 2 parts
Potass. iodid..... 3 parts
Lanolin..... 20 parts

2. When fluctuation is noted, the suppuration should be hastened by *hot* applications, until the gland has completely broken down and is full of pus. A small incision is then made and the pus evacuated. Iodoform glycerin

(10 per cent) is injected into the cavity three times in succession, the first two injections to run out, the third to remain in the cavity. A moist compress with liquor aluminii acetatis is then applied until the next day when the wound is again emptied and a single injection of the iodoform emulsion made. The wound is covered with dry dressings and is usually closed and healed in five or six days. Occasionally the treatment has to be repeated after a week. Where suppuration goes on very slowly, a free incision is made, the cavity scraped out thoroughly with a sharp spoon, and the wound packed with antiseptic gauze and permitted to heal by granulation. This, however, requires six to eight weeks and necessitates daily dressings.

TUBERCULOSIS

Autopsy studies and histologic examinations of surgically obtained material have established the fact that genital tuberculosis is considerably more frequent than is generally appreciated. In compiling 20,122 records of post-mortems in women and girls, von Jaschke and Pankow found tuberculosis of the genitals in 357 cases (1.8 per cent). Considering only those who died of pulmonary tuberculosis, genital lesions were discovered in about 10 per cent; Turner even found a percentage of 14.7 per cent in 955 such autopsies. In the living, an average of 10 per cent of all chronic adnexal affections is caused by the tubercle bacillus. In certain parts of the world, however, the affection seems to be more frequent than in others, and the percentage in this country is probably lower than, for instance, in Germany. As to the frequency of tuberculosis of the genital organs, tubes, corpus uteri, cervix, ovaries, vagina, vulva, are affected in the order named. By far the most common seat is in the tubes (about 85 per cent), and in about one half the cases, the uterus is affected coincidently.

Tuberculosis of the genitals occurs at all ages, but the reproductive period in the second and third decades of life is particularly exposed.

Primary tuberculosis introduced from without by digital examinations, instruments, cohabitation, etc., is extremely rare. Secondary tuberculosis from a focus somewhere else in the body is by far the most common mode of infection. Such an infection may result from a direct extension from a neighboring organ, for example, the peritoneum, intestine or bladder, or, even more frequently, by way of the blood stream from a focus distant or near at hand. As to this focus, it is known that the primary infection is usually located in the lungs.

From a practical standpoint it is, therefore, advisable to consider every case of genital tuberculosis as secondary and to search carefully for the primary seat of the infection. This would guard us against overlooking the original focus, the location and stage of which have an important bearing on the question of prognosis and treatment.

Not in every case of exposure do the genitals become diseased. A high local resistance may protect the organs from infection. On the other hand,

several predisposing factors may favor the bacterial invasion. An inherited disposition is probably of some importance. Certain it is that in arrested development and hypoplasia of the genitals a disproportionately large percentage of local tuberculous lesions has been observed. Gonorrhea is regarded by some as an important etiologic factor. The coexistence of syphilis and tuberculosis according to my own observations is not infrequent, particularly in the large hypertrophic growths about the vulva. Women with genital tuberculosis are apt to be sterile because of the destructive changes in the tubes and endometrium. On the other hand, patients with pulmonary tuberculosis are often very fertile and in these, genital lesions, particularly at the placental site, occur not so very infrequently after a puerperium or abortion.

Wherever the tubercle bacilli gain access to the tissues, they incite a slow proliferation and enlargement of the stroma cells. From their resemblance to epithelial cells they are called epithelioid cells. In some of these epithelioid cells a multiple division of the nucleus takes place, and the numerous nuclei arrange themselves in a fairly regular fashion around the periphery of the cell. We now speak of a giant cell. The latter forms the center of an area composed of a ring of epithelioid cells and beyond that a more diffuse accumulation of lymphocytes and plasma cells. The fusion of several such "giant cell systems" gives rise to the "miliary tubercle" which now becomes visible to the naked eye as a minute grayish or yellowish nodule. Tubercle bacilli may be found within the tubercles, but more often they can be demonstrated at the periphery. The lack of vascularization within the tubercle predestines the structure to degeneration. Caseation takes place in the center and leads later to the breaking down of the tubercle while on the edges the pathologic proliferation proceeds. If the first process predominates, we speak of ulcerative tuberculosis, in the second case, of hypertrophic tuberculosis. Both forms are more or less coexistent. In any case, the normal tissue is eventually destroyed and replaced by this new granulation tissue though progress is usually slow. For further details, the excellent work by Norris on *Gynecological and Obstetrical Tuberculosis,* and the respective chapters in Frank's *Gynecological and Obstetrical Pathology* may be consulted, both books being part of this series of monographs.

Tuberculosis of the vulva is observed in the form of ulcerations or as elephantiasic hypertrophies and tumor formation. Both features are usually present in different parts of the lesion. Fistulae, sinuses, or perforation into adjoining organs are of frequent occurrence (Fig. 59). The differential diagnosis from syphilis and carcinoma requires the microscopic examination of excised pieces. The local symptoms consist mainly of burning, discharge, and odor.

Tuberculosis of the vagina is rare. It occurs in the form of ulcers which, as a rule, are located on the posterior vaginal wall either behind the introitus or in the posterior fornix. Recently, Cullen observed a well defined tuberculous ulceration on the anterior vaginal wall. The edges were undermined, the base was uneven and covered with cheesy masses (Fig. 60).

Tuberculosis of the cervix occurs either as an ulceration or a papillary growth. The differentiation from carcinoma or gumma is rather difficult;

at times, even a microscopic examination may leave one in doubt. The fact that tuberculosis of the cervix and of the tubes may coexist, occasionally aids in the diagnosis. The uterine body is rarely, if ever, affected at the same time.

Tuberculosis of the uterus is usually secondary to that of the tubes. Consequently the mucosa of the uterine horns is first and most intensely infected. The rest of the endometrium becomes affected gradually, either by miliary nodules or in the form of a diffuse caseous degeneration. The result is in the beginning a purulent discharge, in later stages hemorrhage. In aged women, a senile atresia of the cervix may cause retention of this

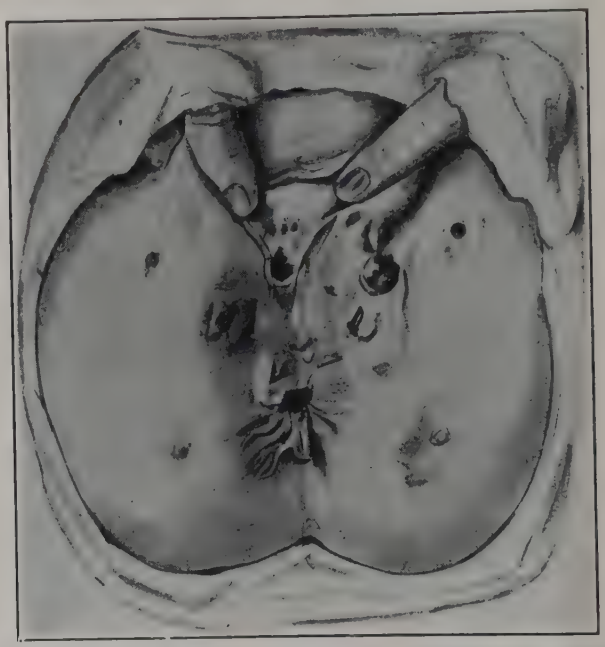


FIG. 59.—TUBERCULOSIS OF THE VULVA SHOWING ULCERATIONS AND FISTULÆ WHICH ALSO INVOLVE THE BUTTOCKS AND ANUS (redrawn from Clifford White after Xavier Bender).

discharge and pyometra. The myometrium is not always involved and the size of the uterus need not be increased. Pain is not always present; in fact, none of the symptoms are characteristic. In making a diagnosis, the condition of the tubes and peritoneum will give valuable hints, and the suspicion is confirmed if an apical catarrh is found in the lungs.

Tuberculosis of the tubes is the most frequent form of genital tuberculosis as mentioned before. The tubes show nodular enlargement and tortuosity; the walls are thick and the size increased to that of a thumb. But there is neither in these findings nor in the symptoms (fever, pain in both lower quadrants, both at rest and after exertions, bleeding, dyspareunia, etc.) any essential difference from salpingitis due to gonorrheal or puerperal infection. The tuberculous pyosalpinx is apt to be fixed high up near the innominate line, but this is not invariably the case. Tuberculous peritonitis

or pulmonary tuberculosis, if present, are of suggestive value; yet, as a rule, the diagnosis can only be a tentative one.

Tuberculosis of the ovaries cannot be diagnosed clinically with any degree of certainty.

Tuberculosis of the peritoneum is of frequent occurrence and appears in two forms. In the first, the parietal and visceral peritoneum is covered with miliary tubercles; the inflamed and highly reddened peritoneum produces ascites which may be either free or encapsulated between adherent loops of intestines. The abdomen is distended, and nodular masses are often palpable, particularly in the umbilical region. These masses are produced by the thick-

FIG. 60.—TUBERCULOUS ULCER OF ANTERIOR VAGINAL WALL. The ulcer measures approximately 6 by 4 cm. The margins which are firm are elevated about 2 mm. above the base. The latter presents the typical apple jelly appearance of a tuberculous ulcer and, on manipulation, fine bleeding points are visible (from E. K. Cullen, *Surg., Gynec. and Obst.*, 1921, vol. 33).

ened omentum and adherent convolutions of intestines. Occasionally, crepitation is plainly felt. The spleen is frequently enlarged. Rectal or vaginal examination reveals nodules upon the peritoneum of the pouch of Douglas, and a coexisting enlargement of the tubes suggests the tuberculous nature of the abdominal fluid and hard masses. In the second form, the intestines grow to each other at once, the mesentery is shortened, the intestinal wall becomes thick and friable, a slowly growing hard mass is felt in the abdomen, and there is no fluid in the abdominal cavity. In both forms caseous degeneration of the miliary nodules gives rise to small or large abscesses.

The diagnosis of the first form is comparatively easy. If a young girl is taken sick with fever, cough, and distention of the abdomen, peritoneal

tuberculosis is the first thing to be considered. Ascites encapsulated in the culdesac is recognized by rectal examination.

For the diagnosis of the second form, the following signs and symptoms are to be considered: distention and tenderness of the abdomen, loss of weight, thickening of the tubes, pulmonary tuberculosis, fever. (Koblanck.)

After all is said, the diagnosis of genital tuberculosis can only rarely be made with certainty. For this reason, the physician must resort to every available diagnostic aid. We have to consider:

1. The history, with particular reference to heredity and previous diseases indicative of tuberculosis, such as persistent cough, apical catarrh, pleuritis, bone disease, swelling of glands, obstinate intestinal disturbances. We learn further from the patient that the present illness began insidiously, was accompanied with slight fever, and has extended over years, with occasional periods of improvement. The symptoms were not very severe at any time, in contrast with the very extensive anatomical findings. Sterility is common.

2. The general examination informs us of the phthisical habitus, scars of former gland resections on the neck, fistulae, lung findings, signs of old pleurisy, digestive conditions, ascites, disease of the bones, cloudiness of the cornea.

3. The demonstration of tubercule bacilli:

(*a*) By the staining of secretions.

(*b*) By inoculation of guinea pigs with uterine secretions, scrapings, excised pieces, ascitic fluid.

4. The microscopic examination of scrapings or tissue particles.

5. The tuberculin test is used either as the conjunctival reaction of Calmette, the intracutaneous method of v. Pirquet, or the subcutaneous injection. Of these, the first two, if positive, merely tell us that the individual tested has tuberculosis, and as approximately 90 per cent of all people have a tuberculous focus somewhere in their bodies, the information is of no great diagnostic value. The subcutaneous test, introduced into gynecology by Birnbaum, is more promising at least in a negative sense. Pankow, who has made a careful study of the question, found that in about three fourths of the cases with genital tuberculosis, the subcutaneous injection of "Old Tuberculin Koch" produced general and local reaction. He came to the conclusion that absence of both these reactions excluded the presence of genital lesions of tuberculosis.

Treatment.—Genital tuberculosis may heal spontaneously or remain stationary for long periods. Operative treatment, which formerly was the sovereign method, has not only a rather high primary mortality, but is also apt to cause a miliary tuberculosis or a tuberculous peritonitis, or it may light up a latent pulmonary tuberculosis. Furthermore, intestinal fistulae frequently follow laparotomies, even if no adherent intestines have been loosened. For these reasons, there is at present a marked conservative trend in the therapy of genital tuberculosis. The treatment must be both general and local.

General treatment consists of rest, fresh air, sun baths, feeding—in short, of all the measures against tuberculosis in general. A very cautious tuberculin

treatment with minimal doses may be expected to increase the weight and thus to fortify the resistance of the organism.

Local treatment is indicated when there are disturbing symptoms on the part of the affected organs.

In tuberculosis of the vulva, cauterization with tincture of iodin or lactic acid is in order; or the tuberculous parts are scraped with a sharp spoon and then cauterized with the thermocautery. X-ray or the violet ray have more recently been recommended. Surgical removal, as a rule, is unsatisfactory, because the wounds made have little tendency to heal, and the operation is usually too extensive for the weakened condition of the patient. In large tumors, applications of some mild astringent solution or dusting with iodoform are good palliative measures.

Tuberculosis of the vagina is usually too extensive to permit of surgical removal. Where the urethra is involved, any operation would only make matters worse and probably lead to incontinence of urine. In Cullen's case of an early tuberculous ulcer, mentioned above, where radium and X-rays had been tried without benefit, a cure was effected by excision.

In tuberculosis of the uterus, whether located in the cervix or the body, an attempt with radium should first be made, as it requires no anesthesia and has given good results in quite a few cases reported in literature. In tuberculosis of the cervix, cauterization with the actual cautery may be made in "twilight sleep." Where the general condition of the patient permits, a total hysterectomy may be performed, preferably by the abdominal route. Norris justly warns against inhalation narcosis and advocates spinal anesthesia. I quite concur in this suggestion though I have had a case of fatal tuberculous meningitis following this mode of analgesia. But I repeat that surgery should not be resorted to unless the local symptoms urge it. Even then, a thorough curettage combined with intra-uterine application of tincture of iodin sometimes suffices to check the bleeding and discharge—at least temporarily.

In tuberculosis of the tubes and peritoneum the same caution as to operation applies. Many years ago, Langenbeck accidentally discovered that a laparotomy, performed for an assumed ovarian cyst, benefited the existing exudative peritonitis. But occasional successes are more than outweighed by disastrous consequences, and, as a general rule, it is far better to use the X-ray and apply dry heat or hot moist compresses, rather than to open the abdomen. By these conservative measures, combined with hot sitz baths and hot vaginal douches, the pain is often relieved and the ascitic fluid absorbed without subjecting the patient to the danger of a major operation. X-rays should be applied in a dosage sufficient to bring about amenorrhea. The patient is then apt to gain in weight, and this possibility makes up for the climacteric symptoms which can readily be relieved by other measures. Among recent writers, Stevenson obtained favorable results from the surface application of radium in two cases of peritoneal tuberculosis. I can quote no particulars as to the technic of this treatment, as the original article was not accessible to me. Schultze, Billon, Hildebrandt, and others tapped the abdomen in tuberculosis ascites and injected 1500 c.c. of oxygen, filtered through cotton

and bichloride solution. All of Schultze's seven patients were cured during an observation of from one half to two years. Absorption of the fluid took place within eight to ten days, and a repetition of the treatment was required in only two cases. Brueckner used nitrous oxid instead of oxygen. Schlesinger, who adopted Brueckner's plan, cured six patients in from two to six weeks. The ascites was absorbed promptly, subjective well-being ensued quickly and the patients could return to work much sooner than after operation. The insufflation of nitrous oxid is of advantage only in the exudative form; in the dry tuberculous peritonitis it causes pain on account of the stretching of adhesions. He first tapped the abdomen and then injected 500 to 1100 c.c. of nitrous oxid (always less than the amount of fluid evacuated) every three weeks until no more ascites could be demonstrated. He then followed this up with a few prophylactic insufflations, from one to three weeks apart. He found that the high fever decreased very soon. While he felt that a definite cure was not yet assured, the simplicity of the method and the rapiditv of the immediate result deserved the attention of the profession.

Findley quotes Johnston as follows: "By comparing the statistical results of cases that have been observed for a sufficient time after treatment, one is impressed with the fact that the figures are about the same in those treated surgically as in those treated by medicinal means, and one may conclude that the prognosis for recovery is good in one fourth to one third of all cases with involvement of the peritoneum." To this, however, I would add that the steadily growing perfection of radiotherapy and other conservative means seems to affect the balance in favor of non-surgical treatment.

LITERATURE

Gonorrhea

Albrecht and Funk. München. med. Wchnschr., 1919, 66: 737.
Amann. Menge-Opitz, Handb. d. Frauenheilk., Wiesbaden, 1913.
Asch. Monatschr. f. Geburtsh. u. Gynäk., 1917, 45: 109, also München. med. Wchnschr., 1922, 69: 1273.
Bab. München. med. Wchnschr., 1919, 66: 591.
Bandler. Med. Gynecology, 3d ed., 1914.
Clark. Am. Journ. Obst., 1914, 69: 968.
Findley. Diseases of Women, 1913.
Gellhorn. Journ. Am. Med. Assoc., 1920, 75: 1647.
Holzapfel. Med. Klin., 1920, 16: 286.
Hunner. Tr. South. Surg. and Gynec. Soc., 1913, 26: 128.
Johnstone. Obstetrics and Gynecology. By J. S. Fairbairn, London, 1920, 559.
Kelly. Med. Gynecology, 1908.
Koblanck. Taschenb. d. Frauenheilk., 3d ed., Berlin and Wien, 1920.
Landsberg. Therap. Monatshefte, 1914, 28: 345.
Nassauer. München. med. Wchnschr., 1919, No. 15.
Scholz. Inaug. Diss., Breslau, 1920.

Stein. Surg., Gynec. and Obst., 1923, 36: 43.
Taussig. Am. Journ. Med. Sc., 1914, 148: 480.
Van de Velde. Zentralbl. f. Gynäk., 1920, 44: 994.

Sepsis

Gellhorn. Interstate Med. Journ., 1918, 25: 506.
Jaschke, von and Pankow. Lehrb. d. Gynaekol., 6th ed., Berlin, 1921.
Johnstone. Fairbairn's Obstetrics and Gynecology, 1921, 562.
Kerr. Clinical and Operative Gynecology, London, 1922.
Pulvermacher. Therap. d. Gegenw., 1917, 58: 57.
Rheinstaedter. Prakt. Grundzuege der Gynäk., 2d ed., 189.

Syphilis and Chancroid

Ahumada. Rev. argent. de Obst. y Gin., 1919, 3: 452.
Gellhorn. Am. Journ. Syph., 1920, 4: 480.
——— Surg., Gynec. and Obst., 1921, 32: 535.
——— and Ehrenfest. Am. Journ. Obst., 1916, 73: 864 (with bibliography).
Horand. Syphilis et Cancer, Paris, 1908, 58.
Howitz. Nord. Medic. Ark., Stockholm, April 30, 1908. Abstr. Journ. Am. Med. Assoc., July 18, 1908, 268.
Kerr. Clinical and Operative Gynecology, London, 1922.
Morton. Genito-urinary Diseases and Syphilis, 1918, 747.
Mouchotte. Revue Française de Gyn. et d'Obst., 1923, 18: 9.
Pollitzer. Am. Journ. Obst., 1916, 73: 837.
Power, D'Arcy. System of Syphilis. By Power and Murphy, London, 1908, 2: 218.
Shillitoe. System of Syphilis. By Power and Murphy, London, 1918, 1: 273.
Stokes. Arch. Dermat. and Syph., 1921, 4: 778.
Thompson. Syphilis, 1916, 181.
Weiss and Conrad. Am. Journ. Syph., 1920, 4: 593.
Wyatt. Fairbairn's Obstetrics and Gynecology, London, 1921.

Tuberculosis

Billon. Tr. 26th Congr. de chir., Paris, 1913, 1066.
Brueckner. Berlin. klin. Wchnschr., 1918, No. 3, 103.
Cullen. Surg., Gynec. and Obst., 1921, 33: 77.
Fueth. In Menge-Opitz, Handb. d. Frauenheilk., 1913.
Frank. Gynecologic and Obstetric Pathology, D. Appleton & Co., 1922.
Jaschke, von, and Pankow. Lehrb. d. Gynaekologie, 6th ed., Berlin, 1921.
Koblanck. Taschenb. d. Frauenheilk., 3d ed., Berlin and Vienna, 1921.
Norris. Gynec. and Obst. Tuberculosis, D. Appleton & Co., 1922.
Pankow. Zentralbl. f. Gynäk., 1907, 31: 1257.
Schlesinger. Therap. d. Gegenw., 1919, 60: 3.
Schultze. Mitteil. aus d. Grenzgeb., 1908, 18: 15.
Stevenson. Dublin Journ. Med. Sc., 1922, No. 24, 632; Abstr. Journ. Am. Med. Assoc., 1922, 78: 1493.
Turner. Quoted from Palmer Findley, Diseases of Women, 1913.

CHAPTER VI

NEW GROWTHS

The embryo is formed by the growth and multiplication of the myriads of cells which make up the human body. After birth this propagation of cells goes on within well regulated limits until the maximum growth of the body is reached. In mature life, perceptible new formation of cells takes place only under unusual conditions. When a part of the body is lost or disintegrated as a result of injury, regeneration by means of cell proliferation takes place to restore function; of this the callus of a bone fracture is an example. Inflammatory irritation produces new formation of cells resulting in local enlargements (inflammatory tumors) which serve to protect the surrounding tissue from further irritation and to restore function; tubal tumors, swelling of the Bartholin glands, and gummatous tumors of the cervix belong to this group.

Neither of these two categories of tumors is a new growth in the strict sense of the word. Rather is this term applied to a proliferation of cells which occasionally arises without any apparent cause and without any purpose to the body. The superfluous mass of cells forms a tumor. If the propagation of cells ceases after a time, the tumor is called *benign.* If, on the other hand, the tumor cells continue to grow unrestrictedly, to invade and destroy adjacent normal cells and tissues and, by way of the blood or lymph stream, to scatter secondary deposits in remote parts of the body (metastases), the tumor is defined as *malignant.*

A malignant tumor ultimately always causes death. A benign tumor is not always so harmless as its name and its structure might indicate and may indirectly endanger life. In gynecology we have ample opportunity to study the symptoms and the course of both varieties of tumors, because the female genital organs are peculiarly and frequently the seat of new growths.

BENIGN NEW GROWTHS

Fibroids of the uterus are well defined, more or less round, solid tumors which vary from the smallest size to gigantic dimensions of many pounds in weight. They are usually multiple and are composed of connective tissue and smooth muscle fibers. As a rule, the connective tissue predominates, which is evidenced by the hardness of the tumor and its white color on section. Preponderance of muscle renders the tumor less hard and shows as a pinkish tint in the cut section. The rare leiomyomata, which consist almost ex-

clusively of muscle, and the somewhat less infrequent adenomyomata, which contain glands and cysts, are of lesser importance to the practitioner.

Normally, fibroids grow very slowly. The rate of growth depends on their blood supply. In pregnancy, therefore, they increase rapidly in size and diminish promptly in the puerperium. If poorly nourished, as for instance in the menopause, they shrink or undergo fatty degeneration or become necrotic.

While the cause of fibroids, as of any other new growth, is obscure, a certain relationship to the ovaries and disturbances of ovarian function is unmistakable. Cystic degeneration of the ovaries is quite frequent. Patients with fibroids very commonly complain of symptoms which we also encounter in ovarian dysfunction, such as tachycardia, adiposity, swelling of the thyroid, nervous disturbances. Further, fibroids shrink when the ovarian secretion has been eliminated by operative castration or radiotherapy. Finally, they develop only during the maturity of the ovaries and may disappear in the climacterium.

Fibroids are most frequently found in the body of the uterus; those originating in the cervix are relatively uncommon. About one in every five women has one or more fibroids.

According to their location in the uterus, they are spoken of as subserous, submucous, and interstitial fibroids (Fig. 61). Originally every fibroid begins as an interstitial growth, that is, within, and completely surrounded by, the uterine muscle. In its further development it may follow one of three courses:

1. It may remain interstitial, and even though it may attain considerable size, it continues to be surrounded by muscle tissue because the uterine muscle undergoes a corresponding hypertrophy and hyperplasia. Interstitial fibroids, especially if solitary, alter the size, not so much the contour of the uterus —a very important point when the question of treatment is considered.

2. It may grow towards the outer surface in the direction of least resistance, until it reaches the peritoneal covering (subserous fibroid). Continued growth causes it to protrude from the uterus, a process which is probably hastened by uterine contractions (sessile subserous fibroid). Eventually it extrudes altogether from the uterus, being connected with the latter only by a stalk carrying blood-vessels with a varying amount of connective tissue (pedunculated subserous fibroid). Subserous fibroids are usually very hard and may attain enormous sizes.

3. It may tend to develop towards the uterine cavity until it approaches the endometrium (submucous fibroid). Its further evolution into a sessile or pedunculated submucous fibroid bears a close analogy to that of the subserous type. While in the former two categories the shape of the uterine cavity need not be greatly altered, the distortion due to a submucous fibroid is necessarily very great, a point of practical importance in so far as an attempt at a thorough curettage is likely to fail. The endometrium is regularly thickened except directly over the tumor where it is thinned out by stretching.

It is not uncommon to find all three varieties in the same case.

The occasional occurrence of fibroid development from the sides of the uterus between the leaves of the broad ligaments (intraligamentous fibroid) need merely be mentioned. As it is incarcerated within the pelvis, it will push the uterus upward and towards the other side.

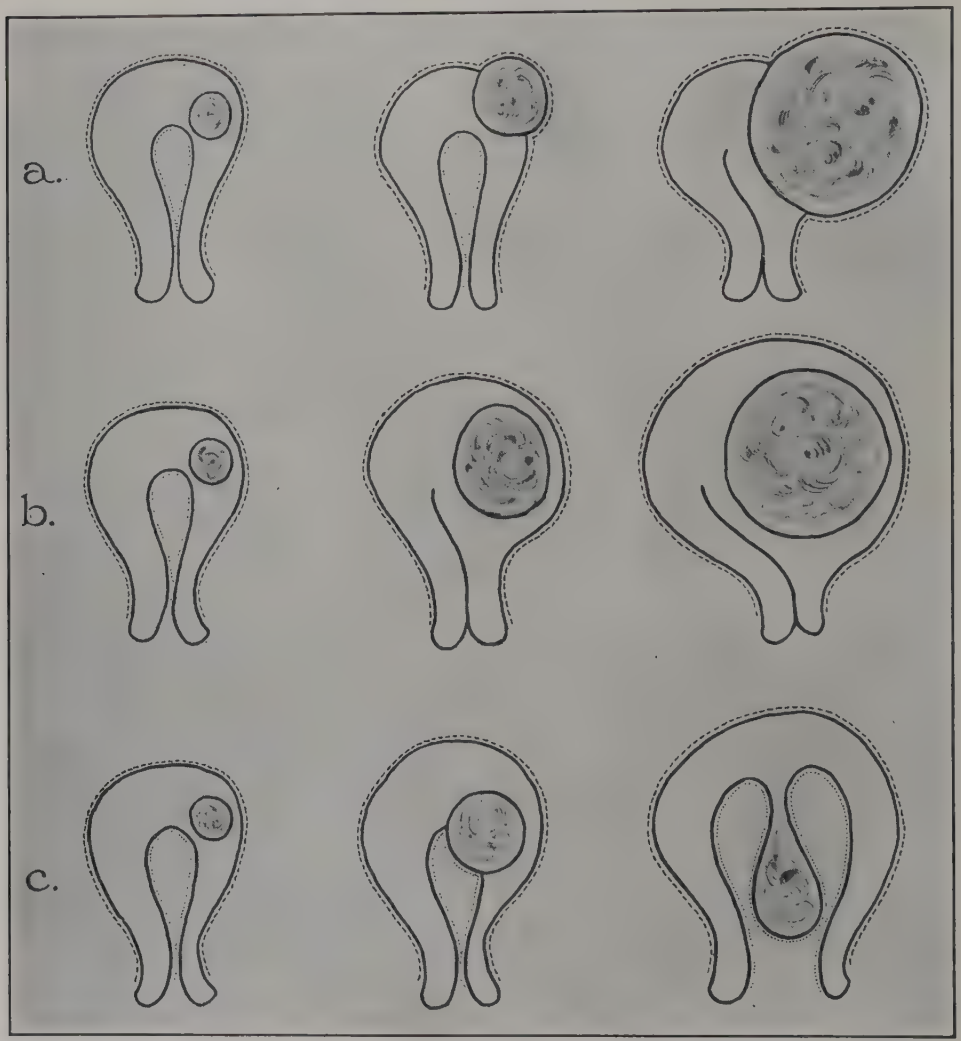


FIG. 61.—DIAGRAM OF DEVELOPMENT OF FIBROIDS (*a*) subserous; (*b*) interstitial; (*c*) submucous.

The cervical fibroid, as its name implies, develops in the cervix, distorts the external os and elevates the uterine body.

The symptoms depend on the location and size of the tumors and any complications.

Most frequent are hemorrhages. These occur in the interstitial and, preeminently, the submucous types, but are less marked or even absent in the purely subserous variety. At first the menstrual flow becomes more profuse and prolonged (menorrhagia) and the free intervals are progressively short-

ened. In the submucous fibroid, there may come a time when there is hardly any let-up; the bleeding continues more or less abundantly throughout the month (metrorrhagia). The normal menopause is delayed and such patients may continue to flow until long after the fiftieth year.

Discharge is present only in the submucous variety. It is mucous or watery. If a submucous fibroid is "born" through the cervix into the vagina, it is easily infected. The resulting gangrene produces an offensive odor, very similar to that of a necrotic cancer, and causes fever.

Pain is the result of torsion of the pedicle of a subserous fibroid or the expulsive contractions of the uterus to rid itself of a submucous fibroid. If the menstrual blood cannot escape readily from the tortuous uterine cavity and undergoes clotting (because the pathologically altered endometrium fails to keep the blood liquid), a severe dysmenorrhea of the obstructive type results. The secondary anemia in the wake of excessive bleeding lowers the resistance of the nervous system, and thus we find sensitiveness to pain increased the longer the fibroid has been in existence. Finally, fibroids may produce pain and other disturbances by pressure upon neighboring organs and structures, such as bladder symptoms, constipation, hemorrhoids, edema, varicose veins, or nerve pain in the lower limbs.

Even remote organs may be affected by very large tumors. Gastrointestinal symptoms or dyspnea are obviously caused by the encroachment of the tumor. The very common cardiac symptoms (palpitations, tachycardia, weakness) are largely due to anemia, in some cases to degeneration of the heart muscle. The careful observer will be impressed with the frequency of enlargement of the thyroid, which in its turn, affects the heart.

The effect of fibroids upon conception depends on their location. Sterility is frequent in the submucous variety and in those interstitial tumors which greatly alter the configuration of the uterine cavity. In a general way it may be stated that the presence of fibroids (unless they are very small and purely subserous) merely delays, but does not absolutely bar, conception. If conception has occurred, the increased blood supply causes rapid growth of the tumors as has been mentioned above.

In the diagnosis the following three points have to be considered:

1. Is the tumor in question a fibroid?
2. Are there any complications present?
3. What is the condition of the urinary organs, the blood, and the heart?

1. The recognition of fibroids is, as a rule, readily made by bimanual palpation and is based upon the findings of an enlarged uterus of firm consistence and irregular outline. The size, shape, and mobility of the uterine tumor is next determined. It is, however, not enough to establish the mere presence of a fibroid, *but it must be demanded to diagnose as far as possible, the variety of fibroids in each case because this question has a direct bearing on the therapy.*

Subserous fibroids are felt as irregular hard knobs upon the outer surface of the uterus; if pedunculated, the stalk is often palpable. The multiplicity of tumors in various stages of protrusion is an aid to diagnosis.

In interstitial fibroids, the asymmetry of the uterus is not so pronounced as in the subserous type, nor is the consistence quite so hard; on the other hand, there is a history of menorrhagia which is usually lacking in subserous fibroids.

The submucous fibroid enlarges the uterus as a whole without affecting its shape to any great extent. It can be diagnosed *with certainty* only if part of it can be felt directly with the examining finger, that is to say, if the tumor extends into the vagina or if the cervix is open. This is most likely to be the case *during* the bleeding; this, then, is the most favorable time for examination. The history of excessive bleeding persisting for the greater part of the intermenstrual period and alternating with more or less copious mucoserous or tinged discharge is highly suggestive. *Under no circumstances should the uterine sound be used for purposes of diagnosis.* Not only is it impossible to feel a submucous fibroid with a sound, but the introduction of this instrument, even if one succeeds in passing it into the tortuous cavity, carries with it the danger of traumatism and infection of the tumor.

2. The recognition of complications is of immense practical importance in the question of therapy.

Sessile subserous fibroids must be differentiated from chronic inflammatory tumors of tubes and ovaries which are closely attached to the uterus. The location of such tumors at the uterine horns, their bilateral occurrence, the presence of cervical catarrh, and the history of the origin and course of the condition may serve as valuable hints. There may, however, be multiple fibroids present and *in addition* inflammatory tumors of the adnexa. The recognition of such complicated conditions is not always simple. I am guided in cases of this kind by localized tenderness on palpation (as a fibroid itself is not sensitive to touch); by restricted mobility of the tumor, unless it happens to be incarcerated within the pelvic cavity; by watching the temperature and the leukocyte count on the day after a thorough examination and noticing even slight rises, and by investigating the past history for any previous occurrence of fever. The inflation of the peritoneal cavity with carbon dioxid (pneumoperitoneum) may perhaps become of great diagnostic value.

Ovarian cysts of moderate size are, as a rule, softer and more symmetrical than fibroids and rather definitely located in one or the other side, though occasionally the correct differentiation may be well-nigh impossible. Large ovarian cysts and large fibroids with cystic degeneration may offer very decided difficulties in differential diagnosis, but a mistake is not serious, as the treatment is the same in both conditions.

The very greatest importance attaches itself to the differentiation between fibroids and pregnancy. The menstrual history, a very thorough examination, if necessary in narcosis, and an observation extending over three or four weeks should guard us against errors. During the weeks of observation, a noticeable increase in the size of the tumor, the occurrence of contractions during examination, later the fetal heart sounds and the X-ray findings will clinch the diagnosis.

It is equally important to recognize a pregnancy complicating fibroids.

In this connection a history of amenorrhea of more than four weeks is of paramount value. Contrary to the statement in some textbooks, I do not believe that fibroids ever cause amenorrhea. If we find, on examination, a clear case of fibroids of the uterus and hear from the patient that the menstrual flow had not appeared at the expected date, we are safe in assuming that conception has taken place. By continued, careful observation, extending, if necessary, over several weeks, it should then not be too difficult to obtain additional proofs. I feel rather strongly that the all-too-frequent mistakes, which are only disclosed on the operating table, are due not so much to inherent difficulties as to laxity and hastiness of diagnosis. An exception may be granted in the case of submucous fibroids or large cervical polyps which may go on bleeding even though the uterus be pregnant, but, after all, such cases are extremely rare.

Degenerative changes are prone to occur in large and small fibroids alike. While hyaline, fatty, or calcareous changes may remain symptomless and hence unrecognized, a tentative diagnosis at least of "red degeneration," necrosis, cystic degeneration, or sarcomatous transformation may be made from a more or less rapid increase in the size of tumor, tenderness and pain, and, in some cases, a rise of temperature. It is impossible to distinguish clinically between sarcoma and other forms of degeneration, though it is claimed by some that the former causes more profuse hemorrhages. Noticeable softness of the tumor, associated with loss of weight, rather strengthens the suspicion of malignancy which occurs in from 6 to 8 per cent of the cases.[1] From a practical standpoint this differentiation is fortunately of little moment because both categories require the same treatment.

The complication with cancer is easily diagnosed if the malignant new growth occupies the cervix. Cancer of the body, on the other hand, is not often recognized because the symptoms of bleeding and discharge are ascribed to a submucous fibroid. In a doubtful case, an exploratory curettage and microscopic examination of the scrapings are indicated. Where, however, the symptoms just mentioned are sufficiently pronounced, this curettage may well be omitted because the treatment would be identical in either condition, as I shall show presently.

I cannot close this discussion without calling the reader's attention to the monographs by Lockyer and Lynch, mentioned in the bibliography of this chapter.

THERAPY

Palliative Treatment.—The main object of palliative treatment is to keep the weakening hemorrhages in check. This is best done with one of the various preparations of ergot which are administered either by mouth or intramuscular injection. Results can be expected only by long-continued administration which, aside from the pain of injections or the effect upon the stomach, carries with it the possibility of ergotism. Further, hydrastis,

[1] Frankl and other authorities estimate the frequency of malignant degeneration as not higher than 2 per cent.

hydrastinin, stypticin, calcium salts, and pituitary extracts may be tried. On the whole, the benefit from any of these styptics is very uncertain.

In the case of an alarming hemorrhage, *firm* plugging of the vagina with antiseptically impregnated gauze or cotton is advisable as a temporary measure. The tampons are left in place for twenty-four hours and may have to be renewed several days in succession if the bleeding continues. In order to be effective the tamponade must be very thorough, which often has the drawback that voiding is impossible and catheterization is required.

I have never seen any results from vaginal douches at a temperature of 115° F. as recommended in some textbooks. Rest in bed during the period with an ice-bag on the abdomen, the avoidance of strong coffee, alcoholic drinks, highly seasoned food, etc., will support the medicinal treatment and sometimes be sufficient to reduce the flow to limits within which it will do no harm.

Curettage used to be a favorite procedure in the treatment of fibroids and, if followed by the intra-uterine application of iodin, formalin, etc., has, indeed, often checked the bleeding for years. But, on the whole, it has a very limited application. If the uterine cavity is at all distorted, curettage is apt to be incomplete and, therefore, inefficient and, moreover, the danger of injuring the capsule of a submucous fibroid and secondarily causing necrosis and infection is so great that a word of warning is not out of order.

The strongest argument against curettage and all other forms of palliative treatment is the revolutionary change in our curative therapy of fibroids. As long as the only alternative was a major operation with a considerable risk to weak and anemic patients or to those enfeebled by age or suffering from cardiac, pulmonary, and renal complications, it was permissible and desirable to ameliorate the symptoms of fibroids by palliative measures wherever possible. The advent of radiotherapy, however, has put into our hands a powerful and beneficial remedy which enters into strong competition with the surgical therapy.

Curative Treatment.—Competition, however, does not denote antagonism. Rather does it mean that both methods of treatment are available and it remains for us to determine which of these to employ in a given case. Such a determination is obviously of value not only to the specialist who is to administer the treatment, but also to the general practitioner, the family physician who is usually the first to be consulted by the patient and who wishes to give intelligent advice in conformity with all the latest advances in our science.

Radiotherapy.—In a general way it may be said that the principal field for radiotherapy is in women of forty or over who have fibroids which do not extend above the umbilicus. The more uniform the enlargement of the uterus, the better is the case suited for this treatment. In other words, the interstitial variety within the limit mentioned is the ideal one for radiotherapy; but those fibroids which tend to become submucous or subserous give equally good results. This group probably constitutes proportionately the largest number of cases that come under our observation. The coexistence of a few more or less pedunculated subserous fibroids, as long as they are

small, does not militate against the employment of radiotherapy. Frank submucous fibroids, as we shall see later, are a contra-indication.

In the second class of patients to be subjected to radiotherapy are the women who are considered poor surgical risks. These are the patients with marked secondary anemia—naturally a rather large class, as most fibroids cause exhausting hemorrhages—the patients with cardiac and renal disease, patients with tuberculosis and other respiratory ailments, patients with high blood-pressure and, finally, excessively stout women. In this class, then, we would resort to radiotherapy even though the patients are below the age of forty.

A third though small category comprises the women who are opposed to any form of surgical treatment.

Finally, we may consider radiotherapy in symptomless fibroids in women above forty. Ordinarily we would not propose any treatment, least of all an operation, in cases of this kind, but, if the fibroids are comparatively large, we might resort to radiotherapy prophylactically, as it were, bearing in mind that a certain percentage of fibroids eventually undergoes malignant changes.

What is accomplished in all these cases by radiotherapy? To begin with, the predominant symptom of hemorrhage is checked in almost all instances. To be more precise, the latest and most extensive statistics teach us that hemorrhage can be relieved in 98.4 per cent, and I shall mention later the possibility of eliminating even the small remaining 1.6 per cent of failures. The second effect of radiotherapy is the shrinkage of tumors. Gauss and Friedrich, a few years ago, proved statistically that shrinkage or even complete disappearance of the tumors took place in from 70 to 80 per cent. It is very likely that by now this percentage has increased, thanks to improvements in technic.

The results accomplished by radiotherapy are brought about in two ways. There, is, first, an effect of the penetrating rays upon the ovaries where the follicles are destroyed and an artificial menopause, a "bloodless castration," is produced. Consequently, the hemorrhages cease and the tumor undergoes a process of age involution. Secondly, there is a specific effect of the rays upon the tumor tissue which leads to rapid diminution.

In order to insure success and to eliminate failures, the following points must be taken into consideration.

Proper Selection of Cases.—This refers to the categories of cases in which this treatment is indicated. If there should be a doubt as to the case belonging to the categories mentioned, or if there should be any question of the case being a fibroid at all, radiotherapy may be either inefficient or even harmful. It is wrong, therefore, says Reifferscheid, for the practitioner to refer gynecologic cases directly to the radiologist for treatment. The gynecologist, instead, should first be consulted so as to decide whether or not the case is suitable for radiotherapy.

Mode of Application.—Of the two methods of radiotherapy, I consider radium superior to roentgen-ray treatment. The radium should be introduced well within the uterine cavity and should remain there, on an ave-

rage, a length of time which would be equal to from 1,500 to 1,800 mg. hours. Hardly ever is a second treatment needed. The radium is contained within an applicator of brass or thin lead and inclosed in pure rubber. The rubber "hose" of a fountain pen is very suitable for this purpose. The uterus is dilated, if necessary, to permit the easy introduction of the radium. If the patient receives two preliminary injections of morphin and hyoscin two and one hours, respectively, prior to the treatment, narcosis beyond a few whiffs of ether or gas is hardly needed. If the case appears uncomplicated clinically, that is, if the bleeding has been confined strictly to the menstrual dates, I do not curet the uterus. If there is any doubt as to the benign nature of the tumor, in other words, if the hemorrhages have been excessive and unusually protracted and if there are other signs pointing to degenerative changes, I perform a curettage to obtain material for microscopic examination. Such a curettage must extend to all accessible parts of the uterine cavity, yet, it should be rather light lest a fibroid lying close to the mucosa be injured. This precaution is particularly to be observed if a protrusion within the cavity can be felt with the curet. If the scrapings appear suspicious macroscopically, a frozen section may be made, if the facilities permit. Personally, I prefer in such a case to leave the radium in place for a longer period, say 3000 mg. hours, and decide on a definite course of procedure, perhaps an operation, after I have studied paraffin sections with leisure.

In any case, the radium must be kept high in the uterine cavity by inserting a narrow strip of iodoform gauze into the uterus. The uterine packer will be found very useful for this purpose (Fig. 83). Neglect of this precaution may lead to a slipping downward of the radium with subsequent cicatricial atresia of the internal os which in turn may result in a pyometra or hematometra—a very unpleasant complication which has occurred in three of my cases.

Combination of Radium and X-rays.—In large tumors where the ovaries are rather remote from the radium tube within the uterine cavity, I prefer to add a few series of X-ray treatments to the radium application.

Time of Radium Treatment.—It has been found that the most propitious time for applying radium is soon after the menstruation. The probability is then much greater that the next menstruation will fail to appear. If, on the other hand, radiotherapy is administered in the second half of the intermenstrual epoch, another menorrhagia is more likely to occur because at that time ovarian hormones are already circulating in the blood in a quantity sufficient to affect the uterus.

Surgical Treatment.—The field for surgery in the treatment of fibroids is fairly well defined. All tumors extending above the umbilicus and likewise all large pedunculated fibroids, whether subserous or submucous, should be operated on because in these three classes radiotherapy is likely to produce necrosis of the tumors. Cervical fibroids are equally unsuited for radiotherapy and should be removed surgically. The same is true of suppurating, necrotic, or gangrenous tumors, and those undergoing cystic or calcareous degeneration.

The age incidence in fibroids is a decisive indication for operation. This means that, as a rule, women under forty should be operated on rather than irradiated. The younger the patient the more clearly is operation advisable. In such individuals, the preservation of menstruation and the possibility of restoring fertility must be borne in mind, and an attempt should be made to enucleate the tumors and leave the uterus behind.

Even when the uterus cannot be saved and the organ has to be taken out *in toto*, we may be able to leave the healthy ovaries behind and thus prevent the disturbances of premature menopause which are usually most distressing in younger women. There is, then, in operations in women under forty no unsexing which, of course, is unavoidable in radiotherapy. Where, however, these are distinct contra-indications to operation (see above), radiotherapy must be chosen irrespective of the age of the patient.

Fibroids complicated by ovarian tumors or tubal infections are to be subjected to operation.

If there is any doubt as to the correct diagnosis of a fibroid, operation is preferable to radiotherapy.

Finally, operation is the proper treatment in the cases where radiotherapy has failed.

Either Radiotherapy or Operation.—While the foregoing indications for the two rival methods are fairly generally accepted by progressive gynecologists and surgeons, there is yet a variance of opinion as to the proper method in tumors which are malignant or being suspected of malignancy. The advocates of radiotherapy call attention to the fact that sarcoma cells are readily destroyed by radium or X-rays, and claim that by using at once a very much larger dose, the so-called sarcoma dose, a cure can be accomplished without operation. Thus, Seitz and Wintz, probably the leading authorities on gynecological roentgenology at present, recently reported that of four uterine sarcomata two had remained cured for five years by means of X-rays. The surgically inclined can claim with equal justification the certainty of complete removal of the malignant tumor by operation. The question, as I said before, is not yet settled. I rather lean to the surgical treatment in these cases.

The complication of fibroids with cancer of the body of the uterus, to my mind, calls for operation. But, if there are contra-indications to operation, such as asthenia or lesions of other organs, radiotherapy may be administered with equal justification. After the curettage, without which the correct diagnosis cannot be made, a dose of 3,000 mg. hours of radium is administered and repeated within a few weeks.

Where an incarcerated fibroid encroaches heavily upon bladder or rectum and seriously interferes with the functions of these organs, surgical removal seems preferable unless the general condition of the patient justifies at least an attempt with either radium or X-rays.

Summing up, we must recognize that the indications for the two methods are for the most part sufficiently well defined. Approximately 60 per cent of all cases of fibroids are suited for radiotherapy, and more particularly for radium treatment, the rest for surgery.

In the hands of the expert, radiotherapy has no mortality. After operations there is, even in the hands of excellent surgeons, an average mortality of from 3 to 5 per cent, but this risk must be undertaken if the indication clearly calls for surgical intervention. On the other hand, it stands to reason that most of the cases that ended fatally heretofore will now be subjected to radiotherapy so that the adoption of this latter method will greatly reduce the percentage of operative mortality.

X-ray treatment has a certain amount of morbidity which is conspicuously lacking after radium therapy. At any rate, the patients are spared the mental and physical suffering which any major operation entails.

From an economic aspect, radiotherapy is less expensive than operation, because the patients are saved the cost of a prolonged stay in the hospital and the expenses for nurses and dressings. Moreover, they are not kept away from their occupation for any length of time.

After all is said, the treatment of fibroids varies in every case and exemplifies the old demand that each patient is entitled to individual consideration.

MALIGNANT NEW GROWTHS

"During the Great War the United States lost about 80,000 soldiers. During the same two years 180,000 people died of cancer in this country."

"One woman in eight over forty years of age is attacked by the disease with fatal results."

"Of the 75,000 deaths from cancer in the United States in 1913, about 12,000 were from cancer of the female generative organs."

Add to these statements taken from the leaflets which are issued by the American Society for the Control of Cancer, the statistical facts that cancer of the uterus forms 30 per cent of all carcinomata in women (Orth, Welsh) and 40 per cent of all genital cancers in women (Berkeley), and you will realize the enormous actual importance of the subject to the general practitioner. It is he who is the first to be consulted by the majority of patients suffering from cancer of the uterus. It is, therefore, incumbent upon him to make himself thoroughly familiar with the symptoms of the disease so that he may diagnose it and institute the appropriate treatment without delay Again, a knowledge of the symptoms presupposes an understanding of the pathology of uterine cancer.

Carcinoma of the uterus may originate in one of three different parts of that organ, namely, (1) the outer surface of the cervix (squamous cell carcinoma of the cervix), (2) within the cervical canal (adenocarcinoma of the cervix), and (3) inside of the uterine cavity (carcinoma of the body). (Fig. 62).

1. The squamous cell carcinoma begins as a small circumscribed lesion anywhere at the external os and, by rapid and limitless proliferation of its cells, increases in three directions: outward into the lumen of the vagina;

sidewise over the rest of the vaginal portion of the cervix; inward into tissue of the cervix. The outward or *everting* growth produces a conglomeration of high papillary structures (Fig. 63) composed in the main of masses of epithelial cells which are feebly supported by delicate connective tissue fibers, but richly supplied with blood-vessels. The slender, fingerlike processes anastomose freely with one another by means of the proliferating cells, thus forming a solid new growth (Fig. 64). By lateral extension over the remaining outer surface of the cervix, this new growth increases in bulk, and at the same time the cells of the new growth invade the underlying tissue of the cervix, and by destroying normal cells in their path firmly anchor the neoplasm in foreign territory, *inverting* growth. Eventually, the tumor may attain a very considerable size and fill the upper half of the vagina completely.

FIG. 62.—DIAGRAM ILLUSTRATING THE THREE PRINCIPAL FOCI FROM WHICH CARCINOMA OF THE UTERUS TAKES ITS ORIGIN (from Kelly, *Medical Gynecology*).

The malignant changes here described in brief outline may go on for quite some time without giving any outward signs of their existence. *The patient feels perfectly well,* and there is at first but a very slight sort of serous transudation, hardly enough to attract the attention of any except the most fastidious woman. The first danger signal comes in the form of a slight tinge of blood in the heretofore clear secretion from the vagina. The cancer cells may have arroded a capillary in one of the delicate papillary projections which constitute the tumor. More often is the scant admixture of blood due to the frailty of the tumor cells themselves, for despite their own destructiveness cancer cells are extremely vulnerable and succumb easily to any mechanical, chemical, or thermic influence. There is plenty of occasion for such an injury in the vagina. The passage of constipated stools, the heat of a vaginal douche, the touch of the douche nozzle or of the penis in intercourse will suffice to break off some of the slender stems of the growth, and even a slight rise of blood-pressure, incident to lifting a burden, will be enough to burst a blood-vessel in the tumor—all traumatisms which the normal cell could easily withstand but which the cancer cell is unable to resist because it is essentially immature, because, in the mad haste of production, it has not had time to develop the stamina of the ripened and well differentiated epithelial cell. The amount and duration of bleeding will then merely depend on the size and number of blood-vessels which have thus been opened. A sharp hemorrhage may, therefore, occur now and then, but there is no regularity to such profuse bleedings and no relationship whatever to the menstrual period, a sign which bears the greatest significance to our subject and stands in marked contrast to the fairly regular hemorrhages caused by fibroids.

If a digital examination is made while the tumor is still intact, the finger feels a large mass springing from the cervix and presenting an irregular

surface which, from a faint resemblance, is called a cauliflower (Fig. 65). The first sensation to the touch is that of hardness, except on the very surface which seems rather soft. But this hardness is deceptive, for the finger can penetrate without much force deeply into the tumor and gouge out large pieces of tissue. The apparent hardness, of course, is caused by the enormous

FIG. 63.—SQUAMOUS-CELL CARCINOMA OF THE CERVIX; FINGER-LIKE PROCESSES ARISING FROM A COMMON STEM. The central delicate stalk of connective tissue and the numerous lateral branches contain blood vessels. Masses of squamous epithelial cells form the covering (from T. S. Cullen, *Cancer of the Uterus*).

accumulation of cells; the yielding to finger pressure is due to the inability of the abnormal cells to withstand any traumatism. Very rarely, however, does the examiner encounter an intact cauliflower. Superficial destruction of the surface has, as a rule, already taken place, streptococci and other septic or saprophytic bacteria have already effected an entrance and have led to infection and necrosis with more or less widespread disin-

tegration of the tumor. The result is the formation of a crater with a sloughing base (Fig. 66) from which exudes a dirty, brownish-gray, stinking discharge, and as the cancerous growth in its further development involves first the vaginal fornices close to the cervix and later the adjacent parts of the vaginal tube, the crater becomes progressively deeper and the foul discharge more copious.

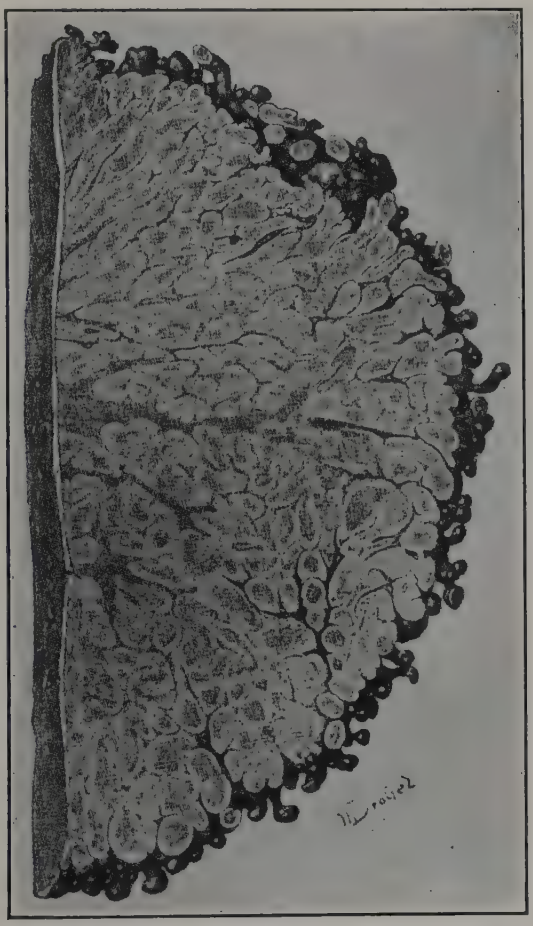


FIG. 64.—SECTION THROUGH A CAULIFLOWER OF THE CERVIX (from T. S. Cullen, *Cancer of the Uterus*).

The general condition now becomes affected. The local sepsis, the absorption of toxic matter, the continued inroad of the cancer with its persistent loss of body fluids, the secondary anemia following the hemorrhages which are growing more frequent and more copious as larger blood-vessels are invaded and opened, begin to tell on the patient. She looks pale, she loses in weight and strength, and her appetite wanes in proportion to her toxemia, often, also, because of the nauseating odor of her discharge. *And still there may be no pain!* This is not surprising to us, though inexplicable to the patient, because we know that the cervix, which was primarily affected, is

very poorly supplied with sensory nerve-endings. Only when the disease has transgressed far beyond the limits of the uterus and has reached the sacral plexus, do lancinating pains in hips and legs occur and render the condition truly pitiable. Symptoms on the part of the bladder usually appear before this time; at first frequency and urgency of micturition, later considerable pain on voiding. Finally the cancer cells break through the bladder wall and eventually give rise to a vesicovaginal fistula. Rectovaginal fistulae are somewhat less frequent, though they, too, occur.

FIG. 65.—MACROSCOPIC APPEARANCE OF A CAULIFLOWER SPRINGING FROM THE ANTERIOR LIP (from Kelly, *Medical Gynecology*).

In some cases, the everting type of growth is absent from the beginning and only the inverting tendency of growth is in evidence. These are the cases where the cancer developed on the basis of an erosion. The characteristic feature is then the formation of an ulcer which in its further development undergoes more or less the same stages which were described for the cauliflower growth.

2. In contrast to the distinctly visible and palpable squamous cell cancer of the cervix, which because of its exposed location presents danger signals at a comparatively early stage, the adenocarcinoma, hidden as it is within the cervical canal, escapes detection for a long time (Fig. 67). Here the cylindrical epithelium developing malignant characteristics penetrates deeply into

the substance of the cervix before increased secretion and hemorrhages may attract attention. The outer edge of the cervix is rather quickly reached by the solid columns of cancer cells and the parametria are invaded and made a part of the tumor. The external os may long remain intact and the normal appearance of the small round opening of nulliparous women or the slitlike os of multiparous patients may deceive the examiner who may have suspected cancer from the history of irregular bleeding. But the introduction of a sound into the cervical canal reveals a cavity of at times surprising extent.

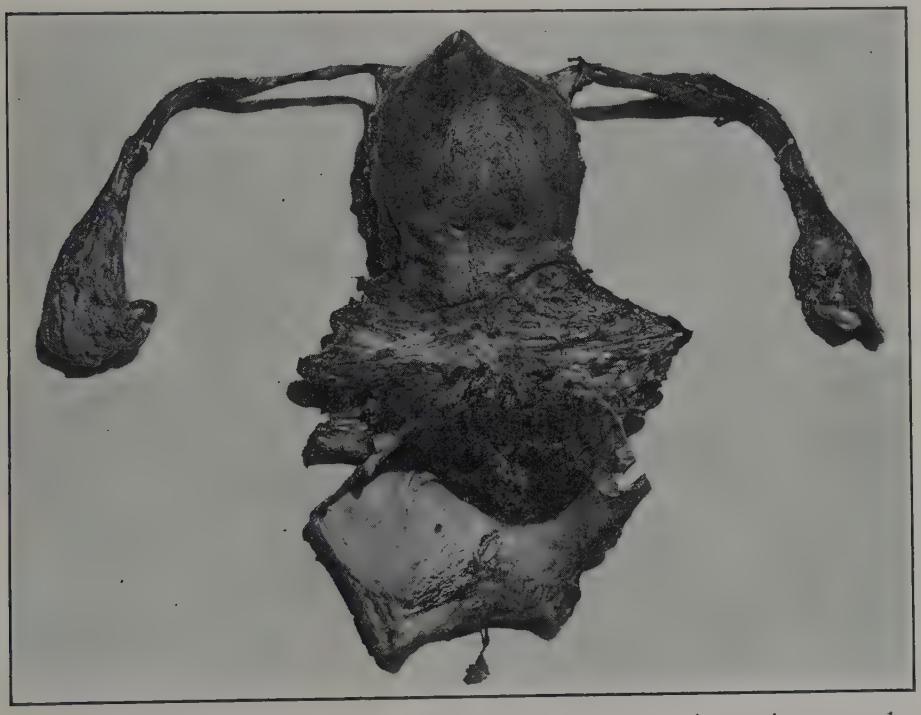


FIG. 66.—SQUAMOUS-CELL CARCINOMA OF THE CERVIX. Infection and necrosis soon produce a deep crater in the tumor.

On bimanual examination, and particularly by recto-abdominal palpation, the ballooning of the cervix and the presence of a bulky tumor extending on the sides to near the pelvic walls leads us to the right diagnosis. In later stages of this form, the outer surface of the cervix is destroyed and there results a deep and wide crater of which it is impossible to say where the cancer started originally (Fig. 68).

3. Even more difficult to diagnose is the cancer of the body of the uterus. A carcinoma originating from the cuboidal or low cylindrical epithelium of the endometrium has the tendency to develop in the form of a polypoid growth which does not project very far into the uterine cavity but involves in concentric extension the rest of the uterine mucosa before it invades deeply into the musculature (Fig. 69). The progress of this form is, therefore, considerably slower than that of the other two types. Clinical symptoms, however, are not lacking. The most typical of these is a profuse watery

discharge tinged more or less deeply with blood. The increased discharge is due to the fact that the cancer cells have inherited from their normal progenitors the faculty to produce serous secretion. The blood, as in the other varieties, comes from arroded blood-vessels. As time goes on, the

Fig. 67.

Fig. 68.

Fig. 67.—Adenocarcinoma of the Cervix. The process may spread far laterally into the uterus before giving any evidence at the external os.

Fig. 68.—Advanced Stage of Cancer of the Cervix. It is impossible to say at which point the growth had its origin.

hemorrhages become more or less continuous, there is loss of weight and, very often, a marked psychic depression.

Cancer of the body is so soft and, as a rule, of so little bulk that the size and consistence of the uterus is not always materially changed; hence, the bimanual examination is often of no avail in the diagnosis. The latter, except in well defined cases where the symptoms leave no room for doubt, rests upon an exploratory curettage and microscopic examination of the scrapings.

The involvement of the regional lymph-glands and the deposition of metastatic growths elsewhere in the body takes place most quickly in adenocarcinoma of the cervix, least rapidly in cancer of the uterine body.

While, thus, cancer eventually becomes a *general* disease and kills the patient in every instance, yet, in its incipiency it is always a strictly localized lesion. If it were possible to detect the new growth in this initial stage, we could with certainty cure every single case of cancer. The more time elapses between its origin and its discovery, the smaller are the chances of recovery by treatment. Hence, the urgent, the imperative need for the earliest possible diagnosis. We hear this cry now from all quarters, but it was only twenty years ago that Winter, of Germany, conceived the idea to start a systematic campaign against ignorance and indifference by an educational propaganda among medical and lay circles in order to prevent fatal delay. This idea was adopted in almost all civilized countries and special societies were founded to promulgate the facts concerning cancer. In our own country the American

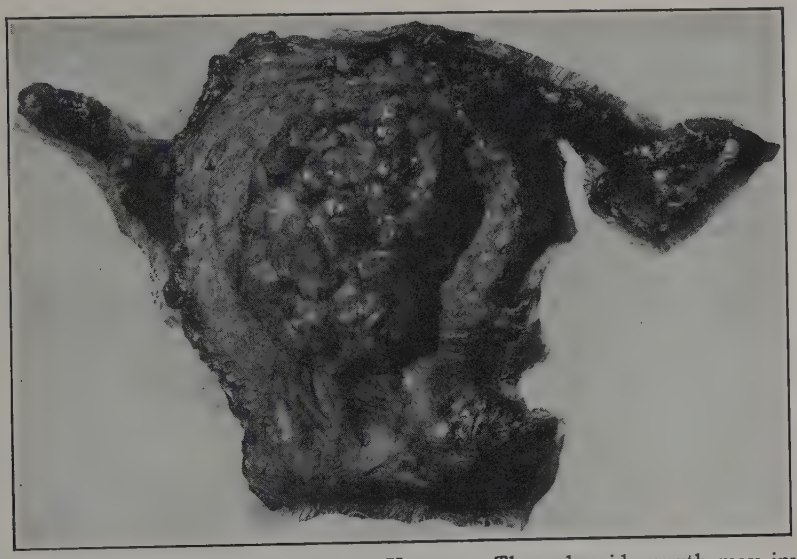


FIG. 69.—CARCINOMA OF THE BODY OF THE UTERUS. The polypoid growth may involve the entire uterine cavity before invading the musculature.

Society for the Control of Cancer carries on the work for which the world is indebted to Germany. Every physician has his share in this work, but, in order to make it bear fruit, we must rid ourselves and the laity of certain obstructions in the forms of obsolete beliefs and habits. There is, for instance, a widespread impression that the "change of life" is often ushered in by profuse and prolonged hemorrhages. It must be the duty of every physician to protest strenuously against this erroneous idea, to insist that the *normal* climacterium is characterized by a gradual fading away of the menstruation, and to preach far and wide that irregular bleeding at or near the menopause is always pathologic and very often suggestive of malignancy. Under no circumstances should the physician be satisfied in such cases with prescribing douches or styptic remedies without having made a bimanual and speculum examination. Nor should the practitioner permit himself to be deceived when his patient tells him that "the period had come back" six or twelve months after the menopause. We know now that the menstruation

never returns after the climacterium has once been firmly established for several months, and that the appearance of blood in such cases almost always spells cancer.

Cancer of the uterus commonly appears in the fourth and fifth decades of life, but younger women are by no means exempt. In the last year I have seen no less than four patients under thirty with cancer of the cervix. For this reason every irregularity of the menstrual flow merits close attention. Unfortunately, the great majority of women still feel, as they did in the middle ages, that menstruation or any other kind of bleeding from the vagina renders them "unclean," and, therefore, desire to have the examination postponed until after the bleeding ceases. The enlightened physician will not give in to this demand. He will insist upon *immediate* examination and to this end put forth all the weight of his authority; and if every persuasion fails, even a plain reference to the possibility of a malignant process is permissible.

Beyond all, he must break down the wrong belief, so cherished by the great mass of the laity, that a disease needs no energetic treatment so long as it does not cause pain, and he will repeat and reiterate that pain is never present in the early stages of uterine cancer and that, when pain actually does occur, it signifies a progress of the disease past a reasonable expectation of permanent cure.

The observant practitioner who is familiar with the signs and symptoms of uterine cancer as they have been presented above will have little difficulty in arriving at the correct diagnosis and differentiating the lesion in question from cervical polyps, submucous fibroids, nabothian cysts, erosions, tuberculous or syphilitic ulcers. If, however, he should be in doubt, he must be careful not to lose precious time by waiting until the progress of the disease has verified his suspicion, or by attempting to treat the lesion with caustics or other harmful or useless agents. If, on examining a bleeding patient, he finds the cervix free from any suspicious affection, he should think of the possibility of cancer of the body of the uterus even though that organ may not present any change in shape or size. In all such doubtful cases, the practitioner has recourse to two expedients. Either he may send his patient to a specialist for examination and diagnosis, or he may make use of exploratory excision or curettage. An exploratory excision should be made in the form of a wedge which includes, if possible, the border between the healthy and diseased tissue. This little operation must be carried out under all aseptic precautions and the small wound must be closed with a stitch or two to avoid unnecessary bleeding. Local anesthesia by means of a ½ per cent novocain solution, or "twilight sleep," renders the procedure painless, but there is no objection to a short gas or ether anesthesia. For diagnostic curettages which are best done in general narcosis, the *entire* uterus should be scraped out thoroughly, and all material should be sent to the nearest pathological laboratory. It is perhaps not superfluous to add that these specimens should be in a conserving fluid, such as weak formalin solution or diluted alcohol, and should be plainly labeled and accompanied by a brief description of the case.

THERAPY

The generally accepted treatment until recently was operation. Since the introduction of radiotherapy into cancer treatment less than ten years ago, the orthodox therapy, however, has undergone considerable changes and modifications. Besides those who adhered strictly to surgery, there were others who combined operation and radiotherapy in various forms, and there were, finally, men of unquestioned authority such as Bumm, Doederlein, Seitz, and Kehrer in Germany, Heymann in Sweden, Recasens in Spain, who re-

FIG. 70.—PHOTOMICROGRAPH OF A SQUAMOUS-CELL CARCINOMA OF THE CERVIX. Note the solid masses of deep-stained epithelial cells.

linquished surgery altogether in favor of the newer method. The whole question is still in a state of flux, less as to the value of radiotherapy than as to the details of administration. I shall, therefore, content myself with describing the plan of treatment which I personally am following *at present*.

In early cases of squamous cell cancer of the cervix, I apply a preliminary radium treatment—50 mg. into the uterine cavity, 75 to 100 mg. in the form of needles buried into the tumor tissue itself, in all a treatment of from 2,500 to 3,000 mg. hours. Three or four weeks later the cauliflower tumor has, as a rule, melted away and the slough which follows any energetic radium treatment has largely or altogether disappeared. If now the uterus is still freely movable, if a careful rectovagino-abdominal palpation fails to detect

any appreciable involvement of the parametria, and a cystoscopic examination reveals no invasion into the bladder, I proceed to operation. By this time the tissues are no longer as excessively hyperemic as within the first two weeks after radium treatment, and the sclerotic changes in the pelvic cellular tissue which may be expected later have not yet fully set in. What is more important, the cervical tumor with its large bulk and its multitude of septic bacteria has given way to a fairly normal-looking cervix free from microbes and living cancer cells. As illustration, I call attention to the two microphotographs taken from sections from the cervix before, and four weeks

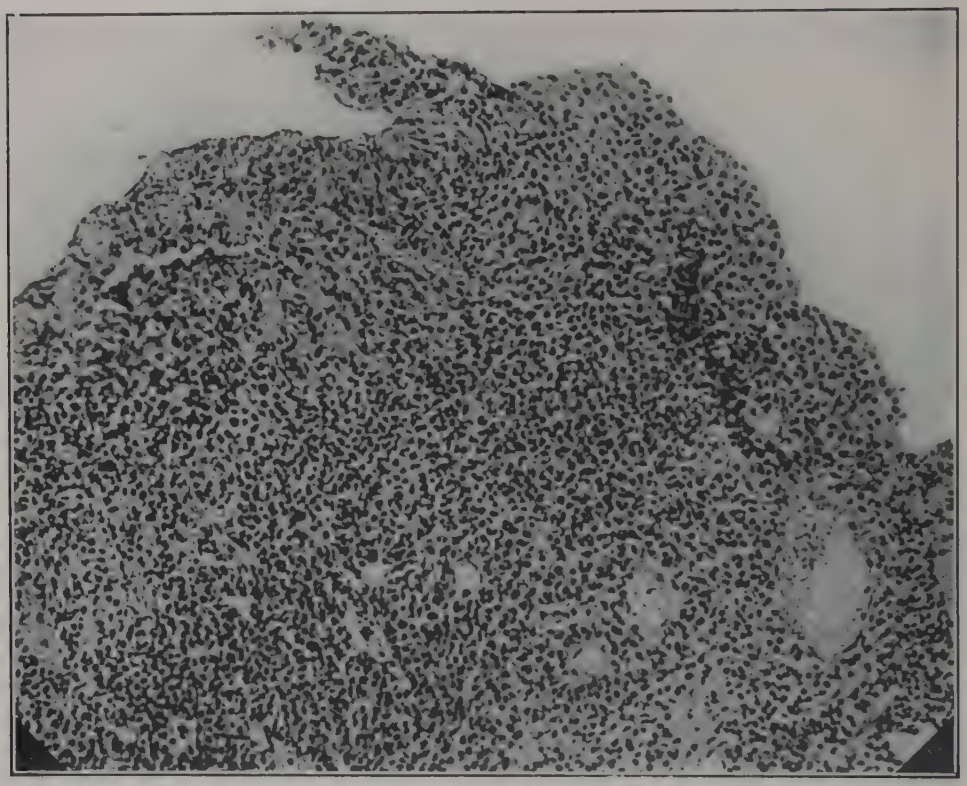


FIG. 71.—A SECTION THROUGH AN ADJOINING PLACE, FOUR WEEKS AFTER RADIATION TREATMENT, SHOWS ENTIRE ABSENCE OF EPITHELIAL CELLS. The picture is that of tissue necrosis.

after, radium treatment (Figs. 70 and 71). The operation is now technically easier and largely freed from the great danger of sepsis which otherwise claims an enormous primary mortality. There is, further, less danger of an implantation metastasis because there are few, if any, cancer cells left in the cervix itself. There is, however, every probability that cancer cells are still in the tissues outside the uterus, beyond the 3 or 4 cm. which limit the extent of radium effect. For this reason, the operation, if undertaken, must be a *radical* one, not an ordinary hysterectomy, but the extensive method which bears Wertheim's name, though it was originally devised by Ries, of Chicago, and subsequently developed by Clark, of Philadelphia, and by Bumm, Mackenrodt, Amann, and other German gynecologists. In this operation the

ureters are dissected out, the entire pelvic cellular tissue with all glands removed, and a large cuff of vagina excised. Postoperative radium treatment carries with it the danger of fistulae and has, therefore, been abandoned by me. Postoperative X-ray treatment which, theoretically, has much in its favor, has been disappointing in my work though in another chapter of this book different experiences are recorded by an expert on the subject.

In adenocarcinoma of the cervix, the plan just outlined would be carried out, were it not for the fact that in actual practice such cancers are almost always beyond their early, so-called operable stages when they are first seen. I, therefore, group them here with the "borderline" cases irrespective of the specific variety, where the mobility of the uterus is somewhat impaired, the parametria are noticeably involved, the vesicovaginal septum indurated, and inguinal and iliac glands palpable. In cases of this kind I abstain from any operation but apply radium in the manner described, aiming to destroy the cancer locally by a lethal dose of 5,000 to 8,000 mg. hours. This dose may be given in two sittings, four weeks apart, particularly if the general condition does not warrant a single prolonged treatment. My experience has warned me against ever giving a third radium treatment; the results have invariably been disastrous.

In the frankly inoperable cancer of the cervix where the uterus is firmly immured in cancerous masses within the pelvis, radium treatment of about 3,000 mg. hours has given me very satisfactory palliative results. Occasionally, a second treatment is given after one month. One can count on a year's prolongation of life with comparative comfort, and I have repeatedly seen such good results extending over a period of two years; in exceptional cases even longer. Others have reported still better results. Giesecke, for instance, writing from Stoeckel's clinic in Kiel, recently stated that 8.33 per cent of his "inoperative" cases had been *permanently* cured by radiotherapy.

As to cancer of the uterine body, the slow growth and the late appearance of metastases have already been noted. In these cases an ordinary hysterectomy preceded by an intra-uterine radium treatment of 2,500 to 3,000 mg. hours has proved sufficient, though it is but fair to say that my personal experience with this class of cancer has been limited.

Before leaving the subject of radiotherapy in uterine cancer, it is well to admit that occasionally an irritation of the rectum is observed some time after an energetic radium treatment. The resulting proctitis is apt to develop into ulcers which are difficult to cure by operation. In such cases, particularly if there is much pain, Kolde recommends starch enemas with twenty drops of tincture of opium. Internally, he prescribes a mixture which was suggested by Adler, of Vienna, of the following formula:

℞	Bismuth. subnitr.	8.0	(ʒ 2)
	Aqu. Laurocerasi.	6.0	(ʒ 1½)
	Ol. Olivar.	30.0	(℥ ʒ 1)
	Syr. Acac.	30.0	(℥ ʒ 1)
	Aqu. dest. qs. ad.	90.0	(℥ ʒ 3)

S.: Shake well and take one teaspoonful four times a day.

In addition, measures to produce hyperemia and thereby better nutrition of the affected parts, such as diathermy, are advisable.

The general practitioner, naturally, is not in a position to resort either to operation or to radium treatment, but I trust the foregoing description will be of practical interest to him because it will show him what can be done for cancer patients. His foremost office is to diagnose the case promptly and advise appropriate treatment by a specialist. His own activity lies principally in the treatment of inoperable cases, where he must endeavor to combat the three cardinal symptoms of hemorrhage, discharge, and foul odor. As radium is not often available to him, he must seek other palliative means. It would fill pages to enumerate all the remedies which have been recommended for this purpose. Having been received and tried with the hope that springs eternal, most of them have passed into oblivion. Of those that are still spoken of in some textbooks, one may be mentioned in order that it may be warned against, and that is chlorid of zinc. The cauterization produced by this drug cannot be measured as to the intensity of its action, and many are the cases where this caustic has penetrated through the intervening cancerous tissues into healthy structures and caused irremediable fistulae and even peritonitis. Of other methods in vogue, vaginal douches can be dismissed with a word. They are absolutely useless, no matter what solution of antiseptics, astringents, or deodorants they contain. The burning out of the cancerous masses with a cautery has much more to recommend it. In order to be really efficacious, it should be repeated at regular intervals for months. This, according to my experience, is usually made illusory by the unwillingness of the patients. Moreover, the procedure which requires some surgical skill and hospital facilities carries with it the danger of perforation into neighboring hollow organs. Nassauer's kaolin insufflation or the sugar treatment of Berczeller (Chapter XXIII) have an excellent drying-out and deodorizing effect but they cannot prèvent the occurrence of hemorrhages.

For this reason, a method which I devised some fifteen years ago and which has been widely adopted both in this country and abroad, is superior to the usual modes of treatment of inoperable cancer. This method consists of the application of acetone to the cancerous area about the cervix and is carried out in the following manner:

1. The cancerous masses occupying the cervix are scraped or scooped out with a curet or, better still, with a very large, sharp spoon (Fig. 72). This may require a few whiffs of ether or chloroform, but in many cases a preliminary injection of morphin renders this short initial step painless.

2. Do not lose time with attempts at checking the bleeding which is usually abundant, but raise the foot-end of the examining or operating table and insert into the vagina a well lubricated Ferguson or other tubular speculum (Fig. 93).

3. Pour into this speculum a tablespoonful of pure acetone, which will check the bleeding immediately. Lower the speculum after about ten minutes and permit the acetone and clotted blood to run out, and fill the speculum once more with pure acetone.

4. The speculum is now held in place for fifteen or twenty minutes,

usually by the patient herself, after which time the table is lowered so that the fluid will run out of the speculum. The latter is now thoroughly washed out with cotton pledgets soaked in water, and then withdrawn. No packing is left in the vagina.

FIG. 72.—THE LARGE, SHARP SPOON OF BOLDT IS VERY USEFUL IN SCOOPING OUT CARCINOMATOUS TISSUE.

The accompanying photograph shows how simple the outfit is which is needed for the treatment (Fig. 73). There is absolutely no pain connected with the procedure provided the acetone does not touch the vulva. Even a single drop of acetone upon the mucosa of the vulva would cause an intense burning which, however, can be relieved at once by washing it off with water. It is for this reason that a tubular and not a bivalve speculum must be in-

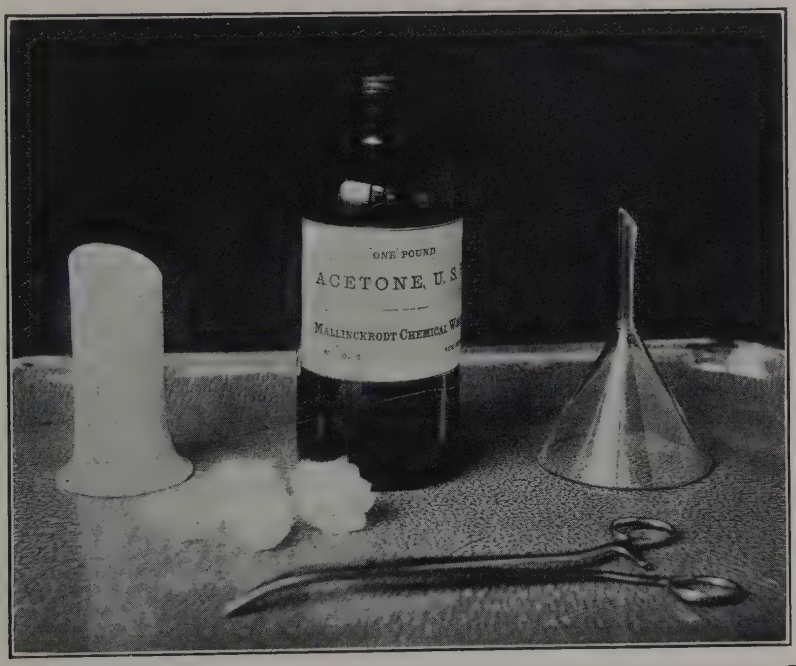


FIG. 73.—THE ACETONE TREATMENT OF INOPERABLE CANCER OF THE CERVIX MERELY REQUIRES A TUBULAR SPECULUM, A FUNNEL, AND A DRESSING FORCEPS.

serted and that the amount of acetone used must not be so large as to run out and over the vulva.

The treatment as outlined above is repeated every two days for at least three weeks, except that the curettage is omitted. For this reason, only the initial treatment need be given in a hospital. Later the intervals between treatments are lengthened to three or four days, and, as the condition responds to the applications, treatments are given only as the case requires.

The beneficial effect of the treatment is usually very prompt. The hemorrhages are, as a rule, the first to disappear. The discharge becomes more watery and soon loses its offensive odor. The general condition of the patient improves fairly rapidly as appetite and strength return, and the severe pain which had interfered with sleep usually decreases to such an extent that very small doses of opiates or even salicylates suffice. Gradually the crater in the vagina shrinks perceptibly and the patient regains, for a time at least, the feeling of good health.

I have been able to prolong life in this manner with a certain degree of comfort in hundreds of cases. I did not expect ever to cure an inoperable patient, nor can such a result be hoped for from the nature of the malady. Yet Dr. Palmer Findley, of Omaha, tells me that he has under his observation two women who have remained clinically cured five years after the first acetone treatment.

The general treatment must not be neglected. Attention must be paid to a nourishing diet, and lack of appetite would be combated with iron and arsenic, strychnin, etc. A little alcohol would undoubtedly benefit some of these patients. Constipation, which is generally troublesome, tends to increase the sufferings and, as the effect of any particular drug soon wears off, the aperient must be changed from time to time. Liquid paraffin may first be tried, or the infusion of senna leaves, cascara, and the like. The patients should be encouraged to be in the fresh air; if they are bedridden, the room must be well ventilated. Water should be taken in large quantities. In a few cases of late I have been amazed and delighted by the tonic effect of milk injections (Chapter XXII) on the general condition. The pain in advanced stages must always be treated. Aspirin, phenacetin, antipyrin, pyramidon, etc., should be given alone or in combination. In course of time the addition of an opiate, for instance, codein in small doses becomes necessary. Gradually the dose will have to be increased and opium itself or morphin given. It would be entirely inhuman to deny the poor sufferer the blessing of even a temporary relief from pain and in these cases, where the end is near, it is quite permissible to give the hypodermic syringe into the hands of the patients. Where the beginning dissolution was becoming obvious, we have not hesitated to keep the patient in a light "twilight sleep" for several days. It is hardly necessary to say that it would be a useless cruelty to inform the patient of her hopeless condition. It is a most difficult task to keep up the patient's courage and to console her from day to day; fortunately, many patients prefer not to see clearly and enter only too willingly into the well-meant deception of the physician.

Cancer of the Vagina.—Cancer of the vagina is usually secondary to cervical carcinoma and its treatment coincides with that of the primary condition. In rare cases, it occurs as a primary lesion, usually in the upper part of the posterior wall. As its symptoms are, as a rule, insignificant, the majority of these cases is not discovered until the process has pervaded the vaginal wall and involved the paravaginal tissues. In any case the treatment is most unsatisfactory and the practitioner should bear in mind that operation, even of a very radical nature, is almost always followed by speedy recurrence.

Unfortunately, radiotherapy is but little more promising, though an attempt with radium or X-rays, the latter through specially constructed specula, should be made.

Cancer of the Vulva.—In the vulva, carcinoma may develop from the vestibule and clitoris, the labia, or Bartholin's glands. It is particularly malignant and in most instances the regional glands become early involved. Very often the growth starts on the basis of a vulvar irritation such as pruritus or leukoplakia. Pain is a prominent symptom, owing to the fact that the tumor quickly becomes ulcerated and infected, and because of the abundant nerve supply in this region. Taussig has written extensively on this subject, and the reader is referred for details of diagnosis and treatment to this author's monograph quoted below.

LITERATURE

Fibroids

Gellhorn. Journ. Am. Med. Assoc., 1922, 78: 259.
Koblanck. Taschenb. d. Frauenheilkunde, 3d ed., Berlin-Vienna, 1921.
Lockyer. Fibroids and Allied Tumors, London, 1918.
Lynch and Maxwell. Pelvic Neoplasms, D. Appleton & Co., New York and London, 1922.
Seitz and Wintz. Deutsch. med. Wchnschr., 1922, No. 11.

Cancer of the Uterus

Berkeley. In Obstetrics and Gynaecology, by J. S. Fairbairn, London, 1920.
Gellhorn. Journ. Missouri State Med. Assoc., 1922, 19: 59.
——— Am. Journ. Radiology, 1921, 2: 23.
Giesecke. Arch. f. Gynäk., 1921, 115, No. 3.
Hoffman. The Mortality from Cancer throughout the World, Newark, The Prudential Press, 1915.
Kerr. Clinical and Operative Gynaecology, London, 1922.
Kolde. Zentralbl. f. Gynäk., 1922, 46: 576.
Lynch and Maxwell. Pelvic Neoplasms, D. Appleton & Co., 1922.
Taussig. Diseases of the Vulva, D. Appleton & Co., 1923.

CHAPTER VII

DISTURBANCES OF NUTRITION

The genital organs are subject to nutritional disturbances leading to tissue changes which can be classified neither with infections nor with tumors. These changes may either be progressive, resulting in overgrowth, or retrogressive, ending in atrophy of the affected parts.

Only those disorders of nutrition which are of practical importance and amenable to non-operative treatment will be enumerated.

PROGRESSIVE TISSUE CHANGES

Overgrowth of Vulva.—In the vulva, overgrowth occurs in the form of condylomata acuminata, condylomata lata, and elephantiasis.

Condylomata acuminata are so frequently the result of gonorrhea that they have been considered in connection with that disease. Condylomata lata are syphilitic manifestations and have been discussed in Chapter V. True elephantiasis is essentially a disease of the tropics and is caused by the filaria sanguinis hominis.

Pseudo-elephantiasis occurs rather frequently in our climate, particularly in colored women. It is almost always indicative of late syphilis and is obviously caused by an obstruction to the lymph-channels in or near the inguinal glands. There is, at first, an edema of one major lip or of both (Fig. 74), or of one of the minor lips (Fig. 75). Then, the connective tissue and the skin respond to the abnormal stimulation by hyperplasia. If only the former is affected, the growth has a smooth surface crossed by a few superficial furrows. If the papillary stratum of the epidermis has become irritated, the surface becomes warty, nodular, papillary (Fig. 76). The tumor increases gradually until it may assume considerable proportions and include the clitoris and minor lips. It may interfere with urination and, when excessively large, cause discomfort by its weight. I have, however, seen in colored prostitutes masses larger than a man's fist that did not inconvenience the patients in walking nor did they interrupt them in plying their trade. In one of my cases, the tumor presented an absolute obstacle to delivery and necessitated cesarean section. The irregular surface with its deep furrows and grooves between the excrescences makes any possibility of cleanliness illusory, even in individuals who would attempt it. A nauseous stench has, therefore, to be endured by the examiner who tests the firm elasticity of the tumor by palpation and searches for hidden ulcerations due to acci-

dental infections, or for the indolent, deep, destructive sores of tertiary lues.

These tumors bear only the very slightest resemblance to carcinoma and are readily distinguished from the latter by their lack of friability, their slow growth, and other signs of syphilis, for instance rectal stenosis. Carcinomatous degeneration of these tumors has never been reported.

Considerable personal experience has shown that specific therapy is of value only in the earlier, that is, edematous, stage of the disease. The bulk of these patients have become refractory to antiluetic treatment and are

FIG. 74.—EDEMA OF THE LABIA MAJORA IN LATE SYPHILIS.

Wassermann-fast. Recent experiments by syphilologists to overcome this acquired "immunity" have not yet led to practical results. Operation is, therefore, indicated. The surgical ablation of these masses is, however, a much more formidable procedure than the inexperienced realize. The poor general condition and the danger of sepsis make the risk of the bloody operation almost prohibitive. To improve the chances, a preparatory treatment is advisable. This consists of iron and arsenic and a strengthening diet as far as the general status is concerned. The lesion itself may be rendered somewhat cleaner by hot fomentations of liquor aluminii acetici, two teaspoonfuls in a pint of water. Ulcerations should be treated with a 10 per cent silver nitrate solution or even the actual cautery.

Overgrowth of the Uterus.—Under this heading we shall deal with permanent enlargements of the uterus which are due neither to infection and inflammation nor to new growth. A full appreciation of the condition is very necessary to the practitioner because he meets with cases of this kind in one form or another almost daily.

Subinvolution.—Immediately after childbirth, the enormously hypertrophied uterus begins to return to normal proportions by the process of involution, which is completed in from eight to twelve weeks. The contractions of the uterus continue after labor and by compressing the vessels and shutting off a great part of the former abundant blood supply, produce

Fig. 75.—Syphilitic Elephantiasis of the Labium Minus.

a relative anemia of the organ. As a result of this, the individual muscle fibers diminish in size. Whether this is due to a fatty degeneration and subsequent absorption of the superfluous protoplasm, or to simple atrophy, or to the action of ferments is not yet fully known nor does it concern us at this moment. It is sufficient for us to keep in mind that by this process of involution the uterus regains its former size in due time. Strictly speaking, the uterus of a woman who has borne a child is always a trifle larger than that of a nulliparous woman, and this enlargement is somewhat more marked after each succeeding parturition; and even where the enlargement is too insignificant to be determined by touch or sight, the microscope reveals an increase in the fibrous and elastic tissues between the muscle fibers and around the blood-vessels. These changes, however, are within physiologic limits and

do not interfere with the well-being of the woman. But if for any reason the contractions of the uterus in the puerperium are interfered with so that restoration of the uterus is arrested or retarded, a pathologic condition ensues which we call subinvolution. Any factor which prevents uterine contractions or brings about a venous stasis has this effect. In many cases both factors are at work. The most frequent causes are slight infections such as may follow the retention of a small piece of placental tissue or of adherent membranes, or else a cervical tear which in itself is too insignificant to give trouble. Protracted, difficult labors or operative deliveries often cause subinvolution by virtue of the low grade infection which they set up. Another common

FIG. 76.—PAPILLARY ELEPHANTIASIS OF THE VULVA IN LATE SYPHILIS.

cause is retrodisplacement, to which, as we have seen in Chapter IV, the heavy and flabby puerperal uterus is particularly prone. Frequent pregnancies in too rapid succession weaken the uterine muscle and prevent firm contractions. In middle-aged primiparae the uterus contains so much fibrous tissue to start with, that retraction in the puerperium is apt to be incomplete. Obstinate constipation causes venous stasis and certain general disorders, notably cardiorenal disease, may likewise impede the return circulation. Finally, it is well known that involution progresses more slowly in women who do not nurse their children. It may be added, parenthetically, that many of these factors are operative after abortions as well.

Whatever it is that interferes with involution, the first change in the tissues is an edema which, temporarily, adds to the bulk of the uterus and gives it its characteristic softness and bogginess. Many of the hypertrophic muscle fibers are absorbed or reduced in size but many others are not, so that there is always more than a normal amount of tissue left. The

fibrous and elastic tissues, which have considerably increased to meet the demands of the expanding pregnant uterus, find even greater obstacles to absorption than the protoplasmic muscle fibers. There is, therefore, proportionately, a greater amount of these tissues left. As the edema is partially absorbed, new fibrous tissue is formed so that eventually the whole uterine wall becomes as hard as a fibroid; indeed, this state has repeatedly been called fibrosis uteri (Fig. 77). Elastic fibers during pregnancy are present in abundance everywhere in the uterine wall, but particularly in the walls of the blood-vessels, and, where these fibers remain behind, they undergo typical age changes; that is to say, elastic tissue, when old,

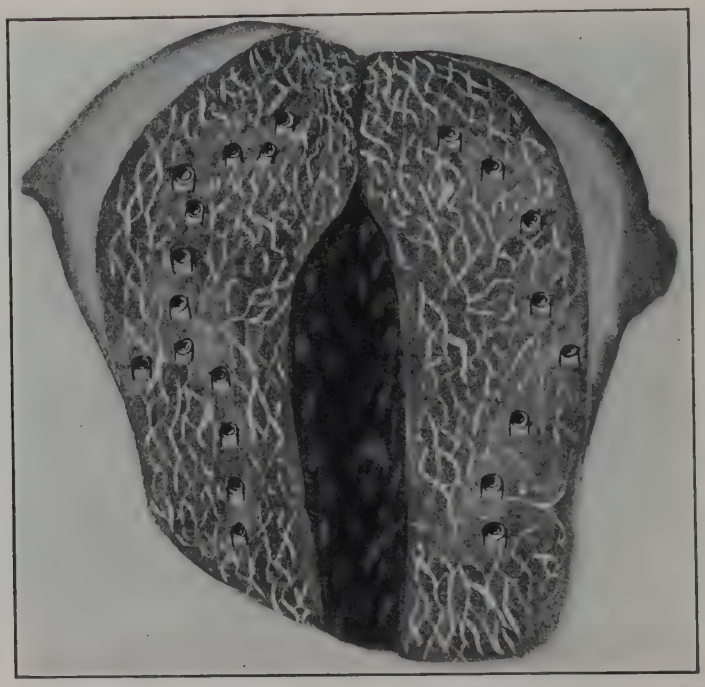


FIG. 77.—SUBINVOLUTION OF THE UTERUS. The uterine wall is greatly thickened, largely due to an enormous increase in connective tissue, and on section thickened vessels with patent mouths stand out above the surface. The endometrium is also thickened.

becomes thick and inelastic, and its wavy fibers straighten out and break easily; and so we see, on sectioning the uterus, the vessels standing out as wide, thick-walled, stiff tubes—hence the name "arteriosclerosis uteri" which has been suggested for this condition. Neither "fibrosis" nor "arteriosclerosis," however, are good terms, because exactly the same fibrous and elastic tissue changes, with only a slight quantitative difference, are found in the uteri of perfectly healthy women. Quite misleading, and therefore objectionable, is the old name "chronic metritis" which implies an inflammatory process, and, as shown by the foregoing brief reference to the pathology which has been the subject of many painstaking investigations by competent observers, subinvolution has none of the features of an inflammation.

Intersected with masses of non-contractible connective tissue, the muscle

fibers are unable to contract upon and compress the sclerosed and resistant blood-vessels at the monthly period, or these vessels may break in places under the force of the menstrual afflux of blood. This, at least, is one of the explanations of the fact that patients with chronic subinvolution are regularly subject to profuse and prolonged menstruations. The flow may last from one to two weeks and in severe cases even longer, so that there may be a free interval of barely a week before the next menstruation sets in. In course of time a very high degree of anemia may develop from the frequent and abundant loss of blood.

When there is no bleeding, there is usually a great deal of leukorrheal discharge, presumably from the thickened endometrium. In some cases, however, the endometrium is thinned out and yet there is leukorrhea.

As a rule, the menstruation is not painful, though occasionally it is just the dysmenorrhea that drives the patient to the physician. There is always a dull ache in the lower part of the back, probably caused by the drag of the heavy uterus, and a sensation of fullness and weight in the abdomen, of which the patient is continually conscious unless she is lying down, and which interferes with her household duties and the enjoyment of life and makes her fretful and depressed. Coupled with this is the effect of the anemia: lack of appetite and loss of weight; headache and vertigo; palpitations and fainting spells; and an overpowering sense of fatigue which completes the picture of nervous exhaustion. The patients drift gradually into a state of chronic invalidism and though there is rarely a direct danger to life, yet the cardiac symptoms should not be taken too lightly, since we know that an excessive secondary anemia may lead to anatomical changes in the heart muscle.

Fertility is often enough interfered with to stamp chronic subinvolution as one of the causes of "one child sterility." On the other hand, if a second conception does take place, abortion is rather apt to occur.

The diagnosis of subinvolution is, on the whole, easy. In the early stage when the connection with a comparatively recent childbirth is obvious and the patient remembers that the lochia had remained bloody for several weeks and were followed by copious discharge, the findings of an enlarged uterus of a peculiarly doughy consistence secures the right diagnosis. In later stages, the patient may have forgotten about her puerperium, but the history of ill health since childbirth and the three cardinal symptoms—bleeding, leukorrhea and dull nagging backache—are suggestive. On bimanual examination, the uterus is found *symmetrically* enlarged to twice or three times its natural size and is of very hard consistence. Position and mobility are normal, unless there is a complicating displacement present or adhesions around the adnexa. The differential diagnosis has to take into consideration the following three conditions: (1) early pregnancy; (2) fibroids; (3) carcinoma of the body.

Pregnancy.—The differentiation is difficult when the uterus is still edematous. There is, however, in pregnancy a softening of the cervix and vagina which is absent in subinvolution. The cervix and the anterior vaginal wall near the introitus exhibit a bluish discoloration in pregnancy, and finally

there is the history of amenorrhea. As these and the other signs of early pregnancy, such as colostrum or nausea, are by no means constant, it is a good rule in all doubtful cases to defer the definite diagnosis for another three weeks when the presumptive signs of pregnancy will have increased in intensity.

Fibroid.—Careful and repeated palpation of the surface of the uterus will usually reveal slight irregularities of the contour. A small interstitial fibroid in the body of the uterus causes no irregularity on the surface and will remain undiscovered; if so, it will not materially affect the therapy.

Carcinoma of the Body.—The distinction between carcinoma of the body of the uterus and subinvolution may be extremely difficult. When the uterine bleeding very plainly reproduces the menstrual type, merely in an exaggerated form, and the discharge though copious is clear and not offensive, subinvolution is the more likely diagnosis. In severe cases, however, the hemorrhage is more or less continuous, the bimanual findings are quite inconclusive, and a definite diagnosis can be made only by a microscopic examination of the scrapings obtained by curettage. This procedure is by far the safest way in women near or after the menopause.

If we consider how extremely common subinvolution is and that it is largely due to avoidable causes, we must realize the great importance of *preventive treatment.* Prophylaxis of subinvolution is synonymous with good obstetrics, and to enumerate the appropriate measures would mean merely the repetition of the instructions regarding the management of labor and puerperium that may be found in any good textbook on obstetrics. It does not seem out of place, however, to name a few outstanding features of prophylactic treatment. Careful observance of rigid asepsis in delivery and strict indications for any operative intervention will avoid the occurrence of sepsis, however slight. Frequent change of position in the lying-in state will, to a certain extent, prevent displacements. Small doses of ergot, administered during the first week as a routine measure in all cases, but particularly in middle-aged women, will favor vigorous contractions. Attention to regular bowel movements prevents venous stasis. The general health of the patient must be improved by an iron tonic and nutritious diet. It has been claimed that early rising after childbirth encourages rapid involution. Personal observations and the bulk of evidence in the literature contradict such claims, but systematic exercises such as enumerated in Chapter XIX certainly exert a favorable effect upon the pelvic circulation.

The retention of small pieces of placental tissue sometimes manifests itself several weeks after delivery. Their removal by curettage is then indicated. The technic of curettage is described in Chapter XVI. It is necessary to emphasize once more the danger of perforation of the flabby uterus at this stage. The curettage, therefore, should be very light and a very large *sharp* curet should be used.

Curative treatment of a fully established subinvolution must aim at completing the interrupted process of absorption. This can be accomplished by means of heat and massage, and it goes without saying that the sooner we get hold of the patient the better are the chances of restitution.

Heat is best administered in the form of vaginal douches. Addition of antiseptics or astringents to the douche water is superfluous, as it is the heat that produces the desired effect; consequently, several gallons of hot water should be used. The temperature should be around 110° F., but in actual practice temperatures are hardly ever taken; it is sufficient that the water should be considerably warmer than the skin but not warm enough to burn it. A very convenient way of taking such protracted douches, which can be arranged in any household where there is running hot water, is shown in Fig. 134.

The patient lies in the bath tub on several thicknesses of blankets which are covered with an oil cloth. The buttocks project an inch beyond the edge of the blankets. The head is supported by a pillow. The feet rest on bricks, pieces of wood, flatirons, or the like. A piece of soft rubber tubing has previously been fitted over the faucet and fastened to it with a string. The smallest caliber of tubing is used. Now the hot and cold water supply is regulated to a suitable temperature, the *force of the water stream being kept down to a minimum.* The patient introduces the free end of the tubing without a nozzle; the tubing, hanging over the knee and fastened to the inside of the thigh by a strip of adhesive plaster, needs no further handling. The water runs into the vagina in a steady stream and out into the bath tub without wetting the patient who is in so comfortable a position that the procedure can easily be continued for one or two hours. One treatment a day, preferably before retiring, is sufficient. The heating of the vagina produces an active hyperemia which, theoretically, should be followed by relaxation and venous stasis. In practice this does not happen and absorption is actually encouraged by the prolonged application of heat. The wrinkled hands of a washerwoman at the end of a day's work is a good analogy.

This form of heat is far simpler and surer in its result than the application of dry heat. Diathermy (Chapter XVIII) probably is as efficient as water, but it requires a separate and somewhat complicated apparatus and leaves the patient dependent on the physician.

This treatment, while it requires a great deal of perseverance, is the *basic* method. All other methods are only auxiliary in character. These are:

1. Massage.—The index and middle fingers of the left hand lie within the vagina, lifting and steadying the uterus, while the fingers of the right hand apply the massage. Beginning with soft, circular movements, light pressure is exerted only in the direction in which the lymph-vessels and blood-vessels empty. The treatments are, at first, short, five minutes or less; gradually time and pressure are increased. If properly executed, the initial pain of the procedure subsides quickly. The treatment should be given on alternate days for two weeks. Acute or subacute inflammations around the uterus contra-indicate massage. For full details see Chapter XIX.

2. Organotherapy.—The fact that the hemorrhages coincide with the menstruation suggests some connection with a disturbed function of the ovaries and perhaps also of other glands with internal secretion. Hence, corpus luteum extract has been injected occasionally with good results. Extracts of the pituitary body, one injection twice a day, sometimes check the

bleeding. Thyroid extract may likewise be tried, if there be any suggestion of dysfunction of the thyroid. On the whole, the effect of organotherapy is very uncertain.

3. Serum Treatment.—Injections of horse serum have been recommended in obstinate hemorrhages. Busse and other German authors have employed human serum; Mayer saw very encouraging results from the serum of pregnant women. I have repeatedly observed a very prompt response from an injection of thromboplastin and similar preparations.

4. Drugs.—Drugs serve to increase the coagulability of the blood, such as gelatin taken internally for a long period of time, or calcium lactate, 1.0 (gr. 15) three times a day, for a week or two. Jaschke recommends calcium chlorid in tablet form or the following watery solution.

℞	Calcii chlor.....	12.0	(ʒ 3)
	Sirup simpl.....	24.0	(ʒ 6)
	Aqu. Dest.....q.s. ad.	250.0	(ʒ 8)

S.: Tablespoonful every two hours.

The calcium salts have this further advantage that they reduce the irritability of the nervous system and it is quite possible that vasomotor disturbances play a part in the hemorrhages.

5. Potassium Iodid.—This should be used if there is any question of latent syphilis.

6. Styptic Drugs.—These by themselves (see Chapter IX) have no effect in the hemorrhages of subinvolution; in connection with protracted douches, they give at times a palliative relief.

7. Vaginal packing and intra-uterine cauterization (Chapter IX).—These are indicated if the severity of the hemorrhages demands immediate intervention.

8. Careful attention to the general condition.—Rest and freedom from worry; change of scene and climate to those who can afford it. Working women should be sent to open-air camps or convalescent homes such as exist in many places nowadays. Here is a wide field for the practitioner who bears in mind that not only the uterus but the entire organism has become abnormal.

If, in spite of this combination of general, local, and medicinal treatment, the hemorrhages persist, a curettage may be tried. It is, however, a fact that the results are very unsatisfactory; bleeding and discharge return in almost 75 per cent of the cases, and the condition of the patient may become so grave or her subjective discomfort so intolerable, that, as a last resort, hysterectomy may have to be considered.

This operation as well as curettage have now become obsolete, thanks to the advent of radiotherapy. A single intra-uterine application of 100 mg. radium for twelve hours or repeated applications of X-rays will almost certainly arrest the hemorrhage. In young persons the effect is equivalent to castration and, therefore, undesirable. The proposition of Mansfeld and Pape to expose only one ovary to the X-ray, is, therefore, worthy of at-

tention. These authors found, independently of one another, that unilateral radiation reduced or altogether checked the menstrual flow without causing climacteric disturbances. For further data the reader is referred to the discussion of menorrhagia.

Hypertrophy of the Uterus.—An enlargement of the uterus closely resembling subinvolution may at times be found in nulliparous women, and even in virgins. Anatomically, the muscular, fibrous, and connective tissues are in their normal proportions to one another, but all constituent elements are increased in number. The endometrium is always thickened. In addition to the symptoms present in subinvolution, these patients complain of severe dysmenorrhea. Shaw assumes that the thickened endometrium is the primary cause of the condition, in that it gives rise to an obstructive dysmenorrhea and to a functional hypertrophy of the uterus as the latter tries each month to overcome the mechanical obstacle. This explanation is quite plausible in the majority of cases. In a few instances, I have had the impression that the incomplete orgasm in coitus interruptus was the cause of the hypertrophy. Where the first etiology obtains, curettage would be the initial step of treatment. In the second class of cases, the avoidance of the etiologic factor is self-evident. As to the rest, the treatment is identical with that of subinvolution.

RETROGRESSIVE CHANGES

The Climacterium.—Climacterium, menopause, change of life are the terms given to that profound transformation of the female organism which is characterized by the cessation of the sexual functions. A full description of this important epoch may well be left to the textbooks on gynecology. What interests us here, chiefly, is a consideration of the retrogressive changes in the genital organs during this period which, be it remembered, extends, on an average, over two or more years. Some of these changes are purely physiologic, others equally strictly pathologic, but the line between them cannot always be drawn sharply, and from both there may arise disturbing symptoms which call for treatment. In addition, the transition from sexual activity to senility, biologically speaking, produces general manifestations which frequently become the object of medical attention.

To begin with the latter, the most prominent symptom is the cessation of the menses. The exact mode of this process varies greatly in different individuals. The ideal type is a gradual fading away of the menstruation: the monthly periods are decreased in amount and duration, the free intervals become more and more prolonged until finally the flow ceases altogether. This type, however, or a very sudden and definite disappearance of menstruation is not as frequent as profuse or prolonged menses alternating with scantier flows. Occasionally a very slight loss of blood may persist for several weeks, or a quantitatively normal menstruation may occur at two-month intervals. In some cases, profuse and irregular hemorrhages set in

after an amenorrhea of several months. In the minds of the laity and even of medical practitioners, the erroneous idea prevails that such hemorrhages belong to the picture of the normal menopause and the emphatic statement made in the chapter on cancer must be repeated that this kind of bleeding is never normal and is usually indicative of malignancy.

The cessation of menstruation as sketched above is the result of a progressive insufficiency of the ovarian function. The withdrawal of the ovarian secretion produces a temporary but decisive alteration in the equilibrium in the endocrine system which manifests itself in a number of vasomotor, digestive, metabolic, nervous, and psychic symptoms. Most common among them are the so-called hot flushes, a sensation of stifling heat, where face and neck and sometimes even a larger area of the body are deeply suffused with blood, which may come on suddenly several times a day and also at night. The congestion disappears after a few minutes and is followed by profuse perspiration and a feeling of chilliness. These symptoms may arise even before the menstrual flow shows any marked irregularity and may persist for years after its cessation. Palpitations of the heart, dizziness, headaches, numbness and coldness in hands, arms, and feet, nausea and sometimes vomiting are concomitant symptoms. Peculiar paresthesias, as if ants were creeping over the skin, are often felt, particularly at the knees. Insomnia frequently results from all these disturbances. Some women at this time experience noises in the ears and various painful sensations in the abdomen, all of which may be explained by the vasomotor changes leading to engorgement of some parts of the body and anemia of others. In many cases there is also a marked arterial hypertension. Dyspepsia, abdominal distention, and flatulency are of common occurrence. In more than one-half of the cases, fat is deposited in various parts of the body, chiefly at the hips and in the abdominal walls. A pronounced instability of the nervous system manifests itself in irritability or mental depression and in severe cases may become the starting point of insanity, if there is an inherited predisposition.

While all the disturbances described are more or less physiologic, and not complained of in equal severity by all women, they are for the most part easily amenable to treatment, at least to the extent that the suffering of the woman who is passing through this trying stage of transition, can be mitigated.

The basis of the therapy must be a general treatment. The entire mode of life should be carefully regulated. Such women must have much fresh air; physical exercise in moderation but with regularity, is of greatest value; attention to the bowels by means of proper diet with an occasional saline laxative; hydrotherapy, and, above all else, psychotherapy to control worry and anxiety, are essential. The internal administration of iron and arsenic supports the general treatment. Coffee, tea, and alcoholic drinks are to be avoided.

As to bleeding, only the cases with irregular flow, even if not excessive, require attention. The main problem, as stated repeatedly in this volume, is to exclude the possibility of an early cancer. The question can be answered only by the microscopic examination of the uterine scrapings. If this

has left no doubt as to the harmless nature of the hemorrhages, and if there is no submucous fibroid or polyp in existence, radiotherapy is the sovereign method of treatment as described in the chapter on menorrhagia. As compared to radiotherapy, the administration of styptics (ergot, hydrastis, stypticin, etc.) or of local caustics (formalin, nitric acid, etc.) occupies a secondary position. Organotherapy is of no avail in climacteric hemorrhages.

Against the various vasomotor disturbances the bromids are extremely useful. I usually prescribe the triple bromids in the following form:

℞	Kal. brom.	8.0	(ʒ 2)
	Natr. brom.	8.0	(ʒ 2)
	Ammon. brom.	4.0	(ʒ 1)
	Aq. dest. q.s. ad.	180.0	(℥ 6)

S.: Two teaspoonfuls in one-half glassful of water between meals and at bed time.

The salty taste of the bromids may be disguised by using Seltzer instead of plain water. The hot flushes and other symptoms disappear very promptly and the patient is able to sleep without disturbance. Unfortunately, acne occurs rather frequently after four or five days of this medication. Calcium bromid, on the other hand, may be taken for a longer period without any by-effects.

℞	Calc. brom.	20.0	(ʒ 5)
	Aq. Menth. piper. q.s. ad.	180.0	(℥ 6)

S.: Two teaspoonfuls in one-half glassful of water (or Seltzer) between meals and at bedtime.

Sometimes a combination of bromid and valerian is advantageous.

℞	Stront. brom.		
	Extr. Valerian. āā	0.3	(gr. 5)
	M. ft. capsul. No. 1.		

S.: One capsule three or four times a day.

When the bromids are no longer tolerated, valerian alone may be prescribed.

℞	Infus. radic. Valerian.	15.0:180.0	(℥ ½: ℥ 6)
	Adde		
	Vin. Pepsin.	60.0	(℥ 2)

S.: Tablespoonful three or four times a day.

The extract of corpus luteum, preferably in the form of intramuscular injections, is decidedly beneficial in a number of cases. Twelve to eighteen injections are given on alternate days, and the treatment is repeated as the need arises. Some patients require two such courses annually for years, but

feel perfectly comfortable in the intervals. An explanation on the part of the physician as to the physiologic nature of the symptoms helps to dispel any apprehensiveness.

Headache is very regular and a most distressing symptom. It is usually felt on the top of the head or in the occiput; in other cases, the patient complains of a tightness in the temples or behind the eyes, the latter being particularly annoying. The usual antineuralgic drugs (aspirin, phenacetin, etc.) are useless and even the bromids often fail to give relief. It is, therefore, well to know that scarification of the cervix usually affords instantaneous ease. This bloodletting may be performed once a month for long periods and helps to tide the patient over until the painful symptom subsides. It is very much more simple than repeated venesections which have recently been recommended for the same purpose. Scarification will also relieve vertigo which is often closely allied with the headache. For this vertigo, Sanes has tried ovarian extract combined with thyroid extract with rather inconstant results.

Climacteric hypertension deserves special mention. Pelnar, Hopkins, Meyer, and others have contributed to this subject of late. The systolic blood-pressure usually ranges between 140 and 170, though occasionally it may be considerably higher and may remain without an arterial sclerosis for a number of years, but in 55 per cent of the cases (Pelnar) sclerosis eventually develops and the ultimate termination is either a cerebral hemorrhage or a cardiac death. Sometimes climacteric and arteriosclerotic hypertension are combined from the beginning, and these are the cases with a tension above 170. It is, therefore, necessary to keep these patients under close watch and examine the urine for albumin and casts. The basis of treatment in such cases must be the accepted dietary and hygienic régime in arteriosclerosis, combined with very small doses of iodin. Ovarian extract and, in selected cases, small amounts of thyroid extract may be tried, and, in addition, psychotherapy is very much in order because so many of these patients are highly neuropathic.

That the thyroid is affected by the withdrawal of the ovarian secretion in the climacterium may definitely be accepted. While the abnormal accumulation of fat would indicate a sympathetic hypofunction which would call for administration of thyroid extract, there are even more cases where we have to assume a hyperthyroidism from the swelling of the thyroid (though rarely accompanied by exophthalmos), tachycardia, tremor, pulsation of the carotids, and various nervous symptoms, such as intense irritability, loss of memory, inability to concentrate, etc. In these last-named cases, cautious X-ray treatments of the thyroid may perhaps be advisable, aside from the appropriate general régime.

A very promising addition to our therapeutic armamentarium has recently been made by Halban in the form of the "Klimasan-Tablets," a combination of calcium lactate and theobromine lactate of each 0.5 (gr. 7½) with a very small quantity (0.0002) of nitroglycerin (gr. $^1/_{300}$). Three to five of these tablets given daily for six or seven days produce a marked and sometimes lasting relief of the various climacteric symptoms. Halban, as a routine,

prescribes two courses of these tablets of one week each, separated by one week without medication. I have been much pleased with the results in two cases in which I tried this combination.

We have thus far considered the *physiologic menopause* which occurs in the majority of cases between the forty-fifth and fiftieth year. There is no essential difference either in symptomatology or therapy between this and *premature* or *artificial menopause*. We speak of the former if a woman loses her menses definitely before the fortieth year. The common causes are infantilism, syphilis, morphinism or other chronic intoxications. The artificial menopause befalls those in whom the uterus and the ovaries or one or the other have been removed by operation, likewise those in whom the ovarian function has been destroyed by radiotherapy ("bloodless castration"). The consideration of this subject belongs more particularly to books on operative gynecology.

Local Atrophy.—Retrogressive changes as the result of menopause manifest themselves in the external and internal genital organs in the form of atrophy. I can omit the details as, for the most part, they require no discussion except in the two conditions which are discussed below. I shall call attention only to two points because there seems to be some uncertainty in the minds of many physicians. The atrophy of the vaginal walls leads to shrinkage of the elastic and connective tissue fibers and as this process is not uniform throughout the length of the vaginal tube, there are here and there annular or crescentic constrictions which project into the lumen of the vagina and may lead almost to a complete atresia. In very old women, at any rate, it may be quite impossible to introduce a finger its whole length. These constrictions, or else conglutinations, of the vaginal mucosa where opposing walls have been in close contact, require no manual or instrumental dilatation as they are entirely physiologic.

The senile and therefore very small uterus falls regularly into retroversion or retroflexion. At this phase of life, the retrodisplacement has no clinical dignity whatever and is not to be held responsible for any backache, bearing down or other symptoms which are commonly associated with uterine displacement during the period of sexual activity. It is, therefore, a gross mistake to recommend to such a patient a surgical operation or to apply a pessary, *unless,* of course, there is, at the same time, a prolapse which must be treated according to the principles propounded in Chapter IV.

The local retrogressive changes which demand treatment are senile vaginitis and kraurosis vulvae.

Vulva and Vagina.—Under normal conditions there is a constant desquamation of the uppermost layers of the multiple squamous epithelium and a corresponding regeneration of layers produced by the cubical epithelium at the base. After the menopause, the desquamation continues but the rate of regeneration is diminished. The mucosa is then thinned out to such an extent that it becomes transparent for the blood-vessels in the papillae. Speculum examination reveals, therefore, upon the mucosa of the vagina and vaginal portion red dots or spots, while on the vulvar mucosa there are usually somewhat larger areas of redness. As the process of desquamation

progresses, the basal layer of cubical epithelium eventually is laid bare on the tips of the papillae (Fig. 78), and there is an oozing of a very scant, watery, and intensely irritating secretion which causes an almost intolerable burning in the vulva that is worse on urination. Bursting of capillaries in the exposed papillae adds a tinge of blood, or the wiping of a cotton sponge during speculum examination will cause a bleeding point to appear here and there. Now and then a case of exceptional intensity is observed where the entire vaginal mucosa is deep red, tender to touch, and covered with yellow or bloody discharge.

The condition is called *senile vulvitis and vaginitis,* but this is a misnomer, because the changes have nothing to do with inflammation.

The diagnosis is made by inspection of the characteristic alterations of the mucosa. On digital examination, the thinness and smoothness of the

FIG. 78.—SENILE VAGINITIS. The papillae are very low; the covering epithelium is thinned out and entirely thrown off in one place. The exposed blood-vessels give rise to transudation of serum and occasional bleeding. The granulating surface may unite with a similar area on the opposite wall, causing adhesions (from Crossen, after Breisky).

mucosa are noticed. Confusion with carcinoma of the vagina or vulva is readily avoided.

Treatment is simple and very satisfactory. A tablespoonful of pure pyroligneous acid (acetum pyrolignosum rectificatum) is poured into the vagina through a tubular speculum, and the latter is moved up and down for about three minutes so as to bring the astringent into contact with the entire vaginal wall. The fluid is then emptied and the vagina gently dried with cotton pledgets. The vulva is painted with a 2 to 5 per cent silver nitrate solution and covered with an indifferent ointment, such as

℞	Acid. boric.	6.0	(ʒ 1½)
	Lanolin		
	Vasel. alb. āā	30.0	(℥ 1)

Relief is obtained almost immediately and the affection is cured temporarily after two or three treatments on alternate days. The patient must be told that the condition will probably return and require a repetition of the treatment.

LEUKOPLAKIA OF THE VULVA AND KRAUROSIS VULVAE.—These are diseases of obscure origin which have so many features in common that they may be considered together, though Stevens insists on sharply differentiating them. In both the various organs and structures of the vulva are involved. Leuko-

plakia is supposed to affect only those parts that are covered with epidermis, that is, the major and minor lips, the clitoris and the perineum, while kraurosis involves in addition the vestibule, the urinary meatus and vaginal orifice, but leaves the labia majora free. Whether or not such fine distinctions are permissible or whether the two lesions represent different stages of one and the same disease, this much is certain, that both diseases begin

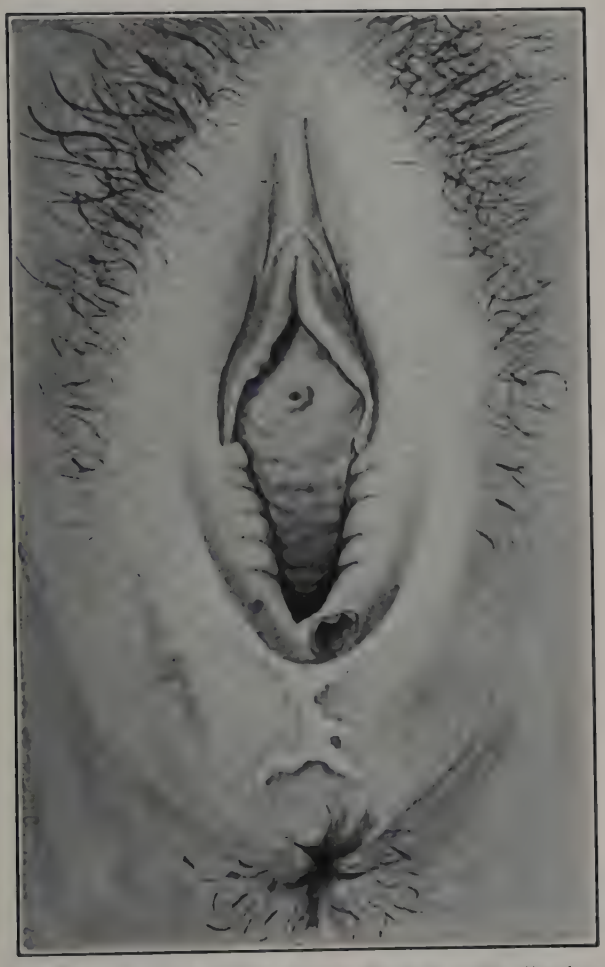


FIG. 79.—KRAUROSIS VULVAE. The entire surface shows a white discoloration which extends downward to the anus. Here and there are grooves and furrows. Two carcinomatous ulcerations have developed at the posterior circumference of the vulva. The shrinking of the parts is just beginning (redrawn from Berkeley and Bonney).

with a leukocytic infiltration of the corium and a thickening and hornification of the surface epithelium. In this stage, the affected parts appear red, swollen, dry, and in places excoriated. Later there are retrogressive changes which cause the epithelium to desquamate and thin out, the connective tissue first to become hyperplastic and then tend to cicatricial shrinkage, and the elastic tissue to degenerate. As a result of these changes, the color of the surface changes from red to white, first in isolated patches, later universally (Fig. 79).

Cracks and ulcers appear with scanty discharge or bleeding, and the various organs of the vulva shrink away and disappear more or less completely until finally the entire surface of the vulva is smooth and white. Hair follicles and sebaceous glands are destroyed fairly early. Gradually the vaginal orifice contracts and in severe cases may be closed completely. Symptoms are absent in only very few instances. In most cases the patients complain of intense itching or burning in the vulva which disturbs the sleep and has a deleterious effect upon the general physical and nervous condition. The incessant scratching followed by secondary infection only adds to the torture and renders the patient's life miserable.

A very serious aspect of the condition is the fact that these changes seem to be precursors of carcinoma. It is, at least, a very rare occurrence to see a cancer of the vulva without leukoplakic discoloration of the surrounding mucosa. Berkeley and Bonney, in England, and Taussig, in this country, have stressed the relationship of leukoplakia and cancer.

As long as we know nothing of the cause, our therapy is merely symptomatic. Our main object is to relieve the well-nigh intolerable itching. All the soothing lotions and salves of the dermatological practice have been used with varying results. Stevens recommends a calomel ointment of the following formula:

℞	Calomel	2.0	(gr. 30)
	Lanolin		
	Vaselin āā	15.0	(℥ ½)

Other ointments suggested are made up with from 3 to 5 per cent carbolic acid, resorcin, bismuth, zinc, ichthyol, etc. They should be applied after the vulva has been shaved and thoroughly cleansed with water and soap. Von Jaschke puts the patient first in a warm sitz bath with bran and afterwards paints the affected parts with a 3 to 5 per cent carbolic acid solution, 2 to 3 per cent silver nitrate solution, or pure tincture of iodin. In one case I had a satisfactory result with a 15 per cent guaiacol vaselin, as recommended by Seligman, but in the next case it failed altogether. Temporary relief is given by the following ointment:

℞	Bismuth. subnit	1.5	(gr. 22)
	Zinc. oxidat	2.2	(gr. 33)
	Menthol	0.75	(gr. 12)
	Cocain. hydrochlor	0.75	(gr. 12)
	Sol. adrenalin	0.75	(♏ 12)
	Lanolin.		
	Vaselin. alb. āā q.s.	30.0	(℥ 1)

A more detailed description of treatment is given in the article on pruritus in Chapter IX.

The majority of the patients are in the menopause. In younger women, Seligman has frequently noted a hypoplasia of the ovaries. An acquired

hypoplasia or hypofunction of the ovaries obtained in a patient of mine, a woman of thirty who was a morphine addict. After the habit had been corrected, ovarian extract tablets taken over a period of months brought about a complete cure. The dry, fissured, and shrunken surface changed into a pinkish, soft, and pliable covering. Schickele, Prochownik, and others have reported similar successes.

As early as 1906, Verani spoke of the promising results of X-ray treatment. More recently this impression has been confirmed by others, and, in a certain number of cases at least, radiotherapy will obviate the necessity of surgical excision of the vulva which is the final remedy if everything else fails. I have under my observation a woman of sixty with a very marked leukoplakic vulvitis and most distressing subjective symptoms. She has had thus far four X-ray treatments at intervals of three weeks, each treatment followed by an application of the violet-ray. The addition of the latter, which stimulates local hyperemia, seems to enhance materially the efficacy of the X-ray treatment, and there is now a marked improvement both subjectively and objectively to be noted.

LITERATURE

Anspach. Gynecology, Phila., 1921.
Findley. Diseases of Women, 1913.
Frank. Gynecologic and Obstetric Pathology, D. Appleton & Co., 1922 (with literature).
Gellhorn. Surg., Gynec., and Obst., 1921, 32: 535.
Halban. Med. Klin., 1922, 18, No. 14.
Herb. N. Y. Med. Journ., 1918, 107: 639.
Hopkins. Am. Journ. Med. Sc., 1919, 157: 826.
Jaschke and Pankow. Lehrb. d. Gynaekologie, 6th ed., 1921.
Mansfeld. Zentralbl. f. Gynäk., 1920, 44: 1260.
Meier. Med. Klin., 1920, 16: 701 (with good bibliography).
Novak. Menstruation and Its Disorders, D. Appleton & Co., 1922.
Pape. Strahlentherapie, 1920, 11: 712.
Pelnar. Ztschr. f. klin. Med., 1916, 82: 284.
Sanes. Am. Journ. Obst., 1919, 79: 7.
Seligmann. Zentralbl. f. Gynäk., 1912, 36: 552.
Shaw. In Eden and Lockyer, New System of Gynaecology, London, 1917, 2: 117.
Stevens. In Fairbairn's Obstetrics and Gynaecology, London, 1921, 689.
Verani. Thèse de Paris, 1906.

CHAPTER VIII

DISTURBANCES OUTSIDE THE GENERATIVE ORGANS

THE URINARY TRACT

There are a number of disturbances of the urinary tract which are encountered almost daily in gynecologic work, and with these the practitioner must needs be familiar. They will be dealt with briefly in this chapter while for further details of diagnosis and treatment the textbooks on urology should be consulted. Reference may also be made to the chapter on disturbances of micturition.

Urethra.—The examination of the urethra consists of inspection and palpation and of examination of the secretion. The inspection considers redness and swelling of the meatus, polyps, prolapse, and new growths. On palpation, the index finger feels beneath the anterior vaginal wall a median ridge or cord which may be slightly moved from side to side. Enlargement, immobilization and undue tenderness of the urethra are indicative of inflammation. Secretion for microscopic examination is obtained with a platinum loop or a small spoon (Fig. 53) after the urethra has been massaged from behind forward.

A frequent cause of painful micturition are urethral caruncles. These are small pedunculated excrescences of a vivid scarlet color, growing from the posterior circumference of the urinary meatus. Histologically they are composed of connective tissue with many blood-vessels, large numbers of round and plasma cells and some urethral glands; the surface is covered with squamous epithelium. The rich blood supply occasionally gives rise to bleeding. Their differentiation from prolapse of the urethra is easy. The proper treatment is excision with scissors and closure with fine catgut sutures or, even more simple, burning off with a dull red electric cautery loop; both procedures require preliminary application of a 5 per cent cocain solution for five to ten minutes. Cauterization with silver nitrate or other chemicals is a popular method but in reality a mere waste of time. The treatment of prolapse requires surgery.

Primary carcinoma appears usually in the form of a shallow ulcer with hard edges and drives the patients fairly early to the physician because of the pain on urination. In other cases a dark red tumor projects from the urethral orifice and gives rise to dysuria and bleeding. Radium needles embedded in the new growth are, to my mind, preferable to operation. I have at present a woman of seventy under observation in whom a large cancer of the urethra was cured by a single radium application of 600 mg. hours given almost two years ago. Where the new growth more or less sur-

rounds the urethra, at times with the formation of a voluminous tumor, and adjacent tissues have become involved, operation is out of the question, and radium offers the only possible chance of cure.

Urethritis.—Urethritis is usually of gonorrheal origin and has been discussed in the chapter on gonorrhea. Occasionally an improperly executed catheterization may lead to a traumatic urethritis, either because of undue force used in the presence of a slight obstacle, or from the rough surface of a metal catheter.

The treatment of acute and chronic urethritis has been considered in Chapter V. It may be added here that the extreme sensitiveness of the urethra may require local anesthesia prior to any treatment. For this purpose 2 c.c. of a 0.1 per cent cocaine solution or 0.5 per cent novocaine solution in normal saline, to which three drops of adrenalin have been added, are injected and the urinary meatus is closed by finger pressure. Analgesia occurs after five to ten minutes. In obstinate cases, salves may be injected into the urethra with a glass syringe; for example:

℞ Iodoform ..... 1.0–2.0 (gr. 15 –30)
Cocain. muriat. ..... 0.1–0.2 (gr. 1½– 3)
(or one of its substitutes)
Lanolin
Vasel. alb. .....āā q.s. 60.0 (℥ 2)

or

℞ Ichthyol. (or argent. nitr.) ..... 0.5–2.5 (gr. 7½–37½)
Lanolin
Vasel. alb. .....āā q.s. 60.0 (℥ 2)

In place of salves, the same drugs may be incorporated in cocoa butter in the form of urethral suppositories which are inserted well lubricated with glycerin. Rebellious cases require cauterization of the ulcerated mucosa with solutions of silver nitrate through a Kelly endoscope.

The pain on urination is relieved by small enemas of a 4 per cent antipyrin solution or morphin-belladonna suppositories.

Cystitis.—The cause of cystitis is always an infection, either from without through the urethra or from above through the kidneys; infection through abscesses in the vicinity or fistulae is rare.

In the first category the invading organisms are staphylococci, streptococci, colon bacilli, or gonococci (usually a mixture of two or more of these microbes), which enter the bladder either spontaneously or, more often, by an unclean catheterization. The chances of infection are intensified by coexistent weakening of the bladder (pressure, prolapse, distortion, urinary retention). A "cold" does not cause cystitis but the chilling lowers the local resistance and facilitates infection or an exacerbation of an old catarrh. I have been impressed in my private practice with the large number of bladder infections in the course of grippe epidemics; it is, of course, possible that in these cases a hematogenous infection with the influenza bacillus had taken

place. Foreign bodies, for instance, hairpins introduced for purposes of masturbation, form an occasional cause of infection.

The acute cystitis manifests itself in frequent urination accompanied and followed by severe pain, burning, and bearing down. There is a constant desire to urinate (tenesmus) and sleep becomes impossible. Fever, if at all present, is very slight. The urine is cloudy and on standing shows a copious mucopurulent sediment. The acute symptoms subside in a week or two. In the chronic stage, which may last for months and even years, the subjective discomfort may be greatly reduced, but is apt to flare up after exertions, or after becoming chilled, etc.

The diagnosis is based upon the history and the chemical and microscopic examination of the urine. Vaginal palpation causes pain, particularly at the neck of the bladder. There is no need for cystoscopic examination in the acute stage, and only if the urine remains cloudy in spite of treatment and where there is a suspicion of a foreign body in the bladder, should cystoscopy be attempted at this stage. In subacute and chronic cases, on the other hand, cystoscopy is indispensable to determine the extent and location of the inflammation.

The frequency of catheter cystitis suggests the proper prophylaxis. If catheterization were carried out with the precautions pointed out on page 12 and followed by irrigation, most cases of postoperative or postpartum cystitis could be avoided.

The treatment of acute cystitis consists of rest in bed, bland diet, and attention to bowels. A hot water bag or hot fomentations reduce the pain. In some cases, warm baths of 35° C. (95° F.) lasting one-half hour, three times a day relieve the tenesmus. If necessary, small doses of opiates by mouth or in rectal suppositories are prescribed. Large quantities of water or milk with lime water serve to wash out the bladder. Of drugs, hexamethylenamin (urotropin) with acid sodium phosphate, of each 0.5 (gr. 7½), helmitol 1.0 (gr. 15), or a tea made with a spoonful of folia uvae ursi in a cup of hot water give quick relief if taken three times a day. In ammoniacal urine, sodium salicylate or salol 0.5 (gr. 7½) are taken.

As soon as the most acute stage is past, the cloudiness of the urine calls for bladder irrigations. For the latter, I prefer a glass syringe with asbestos piston holding two ounces of fluid because the rapidity of inflow can better be regulated than by using an irrigator or a pump (Fig. 80), Overdistention of the bladder must be avoided in the beginning of the treatment. Irrigations are made daily, if they are well tolerated, and later every second or third day. The fluids used should not be hot; a lukewarm temperature is borne best. The popular boric acid solution seems to me to have no advantages over ordinary water and I have therefore abandoned it altogether. For the first three or four injections, while the tenderness is still rather pronounced, I use a weak solution of iodid of silver ("argentid") or of permanganate of potassium, injecting one ounce at a time and repeating the procedure three or four times at each treatment. For the following injections, nitrate of silver solution 1:3000 is used and, if well tolerated, this solution is increased in strength to 1:2000 and 1:1000 at subsequent treatments.

All silver nitrate solutions must be prepared with distilled water, and after each treatment, the bladder is irrigated with plain sterile water until the fluid returns clear. Where the sensitiveness of the bladder interferes with the irrigations, 100 c.c. of a freshly prepared 4 per cent antipyrin solution or of 0.01 per cent cocaine or 0.5 per cent novacaine solution, the last two with three drops of adrenalin, are injected and left in the bladder for fifteen minutes before proceeding with the silver nitrate injections.

In very obstinate cases where frequent catheterizations are too painful,

FIG. 80.—GLASS SYRINGE AND CATHETER FOR IRRIGATION OF THE BLADDER.

a permanent catheter of rubber or glass (Fig. 81) is inserted. A rubber tube attached to these catheters dips into a glass vessel containing a weak disinfectant. Daily irrigations cleanse catheter and bladder.

In chronic cystitis the vesical mucosa is often free from inflammatory changes. Only the trigon and the posterior circumference of the sphincter show, on cystoscopic examination, the remnants of the pathologic process in varying intensity in the form of a more or less diffuse reddening, prominent blood-vessels ("hemorrhoids"), desquamation of the epithelium, or polypoid

FIG. 81.—SKENE'S RETENTION CATHETER. Thin rubber tubing attached to the catheter leads the urine into a vessel filled with antiseptic solution. The end of the tubing dips into the solution to prevent ascending infection.

excrescences of the edge of the sphincter. In these cases, which before the more general use of the cystoscope were classified under the name of "irritable bladder," irrigations of the entire bladder are nonsensical and internal medications useless, but prompt relief can be obtained by instillations through an Ultzman syringe (Fig. 82) of a very few drops of a 1 per cent solution of silver nitrate into the *empty* bladder. Catheterize first; then insert the Ultzman syringe, turn the curved end of the silver stem downwards toward the trigon, eject the fluid, tap the side of the stem with the finger so as to shake off the last drop and avoid painful cauterization of the urethra, and

withdraw the instrument. The instillations may be repeated every other day; if stronger solutions (2 to 5 per cent) are used, the intervals must be longer. The first few instillations may cause enough pain to warrant the use of opium-belladonna suppositories; with continued treatment, however, the pain is lessened in intensity and duration. Protargol, argyrol, etc., may be used for these instillations; while less painful, these drugs are also less prompt in their remedial effect.

Bacteriuria.—In some cases the freshly voided urine is very cloudy and contains innumerable bacteria, chiefly the bacterium coli. The etiology is not sufficiently clear. There is no pus in the urine nor are there any inflammatory reactions on the part of the bladder. The treatment consists of internal urinary antiseptics and bladder-irrigations with nitrate of silver (1:3000 to 1000) or oxycyanate of mercury (1:10000 or stronger). There are, however, a good many cases which remain recalcitrant to any form of

FIG. 82.—ULTZMANN'S SYRINGE FOR INSTILLATION OF SMALL QUANTITIES OF STRONG SOLUTION INTO THE BLADDER (Kny-Scheerer).

treatment and, at best, the condition can be held in check only temporarily. Exposure to cold, exertions, sexual excesses, alcohol, and many other causes are apt to stir the bacteriuria out of its latency.

Tuberculosis of the Bladder.—Tuberculosis of the bladder is practically always secondary to tuberculosis of the kidneys. The local symptoms consist of intense pain in the bladder increased during micturition; the latter becomes very frequent as the bladder quickly loses its normal capacity. With the approach of menstruation, the distress is intensified; occasionally, the reverse is true. The general symptoms of fever, loss of weight, and night sweats, and the recognition of tuberculosis in other organs (kidney, lungs) suggests the diagnosis. The latter depends on the examination of the urine and on cystoscopy. The urine is cloudy, acid, and contains pus and often blood. Staining for tubercle bacilli in the pus is not always successful and sometimes inconclusive. Therefore, inoculation into animals becomes necessary. Cystoscopic examination which because of its great painfulness requires artificial analgesia (opiates, "twilight sleep," general narcosis) demonstrates the grayish tubercles in the reddened and swollen mucosa, particularly in the vicinity of the ureteral openings; ulcers are the result of breaking down of these nodules.

The general treatment with fresh air, sunshine, and forced feeding is as important in tuberculosis of the bladder as in that of other organs. Locally, opium-belladonna suppositories, fomentations and hot sitz baths are of use to relieve pain. Irrigations of the bladder, particularly with silver nitrate, make matters worse; in fact, the failure of this treatment in a case of acute

or subacute cystitis should make us suspicious of tuberculosis. I have seen palliative improvement from frequently repeated injections of 5 to 10 c.c. of an iodoform solution.

℞ Iodoform	2.5	(gr. 37)
Guaiacol	6.0	(ʒ 1½)
Ol. sesami ..... qs. ad.	120.0	(ʒ 4)

If the urethra is likewise involved, a few drops of this emulsion may be deposited there while withdrawing the catheter. The more or less intense burning sensation caused by the injection, subsides after a few minutes.

The causal treatment of tuberculosis of the bladder in its earlier stages requires the extirpation of the diseased kidney if the affection is unilateral. This belongs to the field of urology. After the removal of the focus in the kidney, local treatment of the bladder with iodoform is more promising of permanent cure. Unfortunately, a contracted bladder often results from tuberculosis and this usually resists any kind of therapy.

Incontinence of Urine.—We have to distinguish between partial and total incontinence. In the former, the sphincter proves insufficient only occasionally when the intra-abdominal pressure is raised as, for instance, in coughing, laughing, straining, running, etc. At night there may be increased frequency but no actual incontinence. This form is most often due to relaxation of the vagina subsequent to childbirth with or without retroflexion and its treatment is gynecologic, that is, a pessary in milder cases, cool vaginal douches, methodical exercises of the pelvic floor muscles, and electricity. A plastic operation, however, promises more certain relief.

Another form of partial incontinence is caused by a unilateral ureteral fistula; this, too, requires operation unless the fistula closes spontaneously within four to six weeks.

In children bed-wetting (enuresis nocturna) may be due to some local irritation, such as uncleanliness, thread-worms, skin eruptions, vulvitis, hyperacidity of urine or bladder stone, and a careful search for any of these conditions must precede treatment. Often, however, no cause can be discovered. We then speak of "essential incontinence" and assume some disturbance of the innervation of the bladder. The literature on enuresis is very voluminous and the great diversity of remedies proposed is suggestive of their frequent unreliability. We mention a few of the therapeutic suggestions not only for children but for adults who have retained the ailment from childhood: manual massage, vibration massage, dilatation of the vesical sphincter, intra-urethral cauterization of the neck of the bladder, medicinal and psychotherapeutic treatment, galvanization, epidural injections, and hydrotherapy in the form of short cold sitz baths or needle showers to back and perineum.

As regards enuresis nocturna in children, Carter outlines the management of these cases as follows: "All local morbid conditions should be discovered and corrected not merely because they may be etiological, but because their elimination is the proper thing to do for the general health of the child. Foci of infection in tonsils, adenoids, or alveoli, should be removed. Highly acid

urine should be neutralized by 5 or 10 grain doses of potassium citrate, and high concentration of urine should be corrected by giving plenty of water during the earlier hours of the day. Constipation must not be forgotten as a possible cause.

"With all possible contributing factors removed, the major treatment of enuresis should be directed towards the training of the nervous system. As a requisite for undertaking treatment, a promise should be exacted from the mother or attendant of wholehearted coöperation, for without this assistance treatment will be of no avail. It is perfectly useless to expect help from parents who are themselves so neurotic that they cannot bear to impose any sort of discipline on their offspring.

"No fluid is permitted after a given hour in the afternoon. The child is taken up at regular intervals, thoroughly awakened, and instructed to urinate. It is instructed to stop and start urination on order. Experience has shown that there is little need for drugs."

Bokay, on the other hand, believes that in neuropathic children who form the bulk of patients with enuresis there is an atony of the sphincter coupled with a spasmodic contraction of the muscle of the bladder, a true spasm which is independent of the will. Therefore, an antispasmodic must be chosen; and atropin is superior to other drugs of this kind. He prescribes a 1 per cent solution of atropin sulphate (for a child aged six) in doses of five drops three times a day in a tablespoonful of sweetened water and increased by one drop each time until ten drops are reached.

Eden and Lockyer point out that the use of the drug (they prefer belladonna) must be prolonged for a considerable time after the incontinence has been relieved.

For enuresis nocturna in adults, Scholz proposes the following outline of treatment:

1. Hospitalization; rest; diet; sedatives and urinary antiseptics; sitz baths; psychotherapy.

2. Hypodermic injections of atropin, 0.001 (gr. $^1/_{60}$), every two to three days; in all six to eight injections (effect usually noticeable after second injection).

3. Epidural injection of 10 to 20 c.c. of normal saline or 1 per cent novocaine solution.

There is, finally, a form of incontinence which is not a persistence of bad habits and lack of training in childhood, but which is a reflex incontinence; for instance, in girls with hypertrophic clitoris or thickened upper hymenal edge. Koblanck ascribes this condition and its sequel to masturbation and claims to have cured both the masturbation and the urinary incontinence by electrolysis of the swollen "genital spots" in the nose (Chapter XX) which are usually found in such patients.

Hematuria.—Blood in the urine may originate from the kidneys, ureters, bladder, or urethra. Etiologically, the following causes may have to be considered: (1) traumatic, including accidental injury such as instrumentation, and also that occurring from stone; (2) inflammatory changes both in the acute and chronic stages in all parts of the urinary tract; (3) vas-

cular, as in hemophilia and other blood dyscrasias, hydronephrosis, varicosities of the vesical veins, etc.; (4) chemical, in which class should be placed hemorrhage from irritating drugs such as turpentine, cantharides, in certain cases phenolphthalein in excessive and prolonged doses, etc.; (5) toxic, as for instance in the course of malaria, acute yellow atrophy of the liver, etc., and also sometimes in toxemias of pregnancy; (6) neoplastic; (7) parasitic, these only in tropical countries; (8) functional, essential or whatever term we want to use to describe our ignorance as to the causation of the bleeding in an individual case.

The most important point about hematuria is to find out at *once* in which part of the urinary tract the bleeding started originally. The treatment depends altogether on this information. The time to obtain this knowledge is *during the bleeding.* After the urine has become clear again it may be very difficult if not impossible to determine the source of the bleeding. The actual search for it by means of the cystoscope or the ureteral catheter had best be left to the specialist in urology unless the physician himself is an experienced cystoscopist. The task and the responsibility of the practitioner lie mainly in his duty to urge a systematic examination *while* the patient is bleeding.

THE RECTUM

The relations between the female genitals and the intestinal tract are numerous and intimate and have repeatedly been referred to in the foregoing pages. Gynecologic diseases, for example, are very frequently associated with constipation. The latter is often the cause, but probably more often the result of the former. Inflammations of the tubes or the pelvic cellular tissue are apt to involve the intestines. Enteroptosis and prolapse are usually due to a common etiologic factor. Appendicitis and salpingitis are often closely linked together. Ovarian cysts with twisted pedicles may gravely affect the intestinal canal and lead to ileus. Uterine fibroids may have the same effect. I have, for instance, operated on a case of ileus where a loop of small intestine was caught and compressed between two pedunculated fibroids. Cancer of the uterus extends in its later stages to the rectum. Conversely, cancer of the sigmoid or the rectum may involve the genitalia or simulate gynecologic diseases. The close proximity of the rectum to the vagina facilitates the extension of infection from one to the other; gonorrheal proctitis and colon bacillus vaginitis may serve as illustrations of the spread of infection in the two directions. Rectovaginal fistulae after labor or operations likewise emphasize this relationship between the genital and intestinal systems which has by no means been exhaustively considered in this rapid survey.

It is this close vicinity of the rectum to the genital organs that makes a familiarity with the rectum and its diseases indispensable for any one engaged in gynecologic work.

The principal complaints arising from abnormal conditions in the lower

rectum and anal canal are (1) pain, (2) hemorrhage, (3) discharge, (4) protrusion, (5) change in bowel movement. To determine the precise cause of any of these symptoms, the patient is placed in the left lateroprone position. The various steps of the examination which I am largely quoting from the excellent description given by Leavitt, are the following:

1. The buttocks having been widely separated, the condition of the surrounding skin, the presence or absence of any swelling and of external openings of fistulae is carefully noted.

2. The patient is now requested to bear down as if at stool. The condition of the sphincter, whether relaxed or contracted, the presence or absence of discharges, the protrusion of external piles or the extrusion of large internal piles, the existence of polypoid tumors or prolapse of the rectum are observed. Even in the absence of any visible pathology, spasm of the sphincter denotes an irritation within the anal canal.

3. The perianal folds are carefully smoothed out and a search is made for fissures. As the latter may occasionally be due to syphilis and are highly infectious, caution is needed.

4. The patient is again requested to bear down, and the gloved and well lubricated finger is, with a gently boring motion, slowly introduced to its fullest extent. Rapid introduction of the finger or pressure against a sore spot in the anal canal will throw the sphincter into spasm and interfere with a satisfactory examination.

By the latter the following conditions are to be determined:

(*a*) Malignant infiltration and strictures.

(*b*) Invagination of the rectum.

(*c*) The roughened surfaces of ulcerations.

(*d*) Foreign bodies, polypoid tumors, or adenomatous growths.

(*e*) The pitlike openings of internal fistulae.

(*f*) The condition of the mucosa, whether dry or moist, whether smooth and thin or thick and in folds, and the caliber of the ampulla.

(*g*) The cordlike infiltrations of fistulous tracts by gently pinching the wall of the anal canal between thumb and examining finger on withdrawing. Internal piles unless greatly thickened cannot be felt digitally. A gum-boil-like feeling is characteristic of submucous fistula.

5. By introducing a tubular speculum—called an anoscope (Fig. 83), proctoscope, or sigmoidoscope, respectively, according to its length—the palpation is verified by inspection.

6. During this instrumental examination, material for bacteriologic and chemical examination of the faces can be obtained.

7. Occasionally, an X-ray examination may become necessary.

Of the various affections of the lower rectum and anus, there are two which are so very often encountered in gynecologic patients that a separate discussion is justified; these are fissures and hemorrhoids.

Fissure in Anus.—"In itself not a serious affection and apparently so trifling a lesion as to be hardly worth considering, anal fissure is probably responsible for more acute pain, suffering, and discomfort than any other lesion of its size occurring in the human body." (Hirschman.)

A fissure is a crack or elongated ulceration in the mucous membrane at or near the anal opening. It is caused by traumatism either during the passage of a hard fecal mass or by introduction or expulsion of a foreign body, sneezing, coughing, or faulty instrumentation.

Fissures are usually single and occur most frequently at the posterior commissure of the anus. "When more than one is present it is an evidence, as a general rule, of the presence of tuberculous, gonorrheal, or syphilitic infection, or some wasting disease."

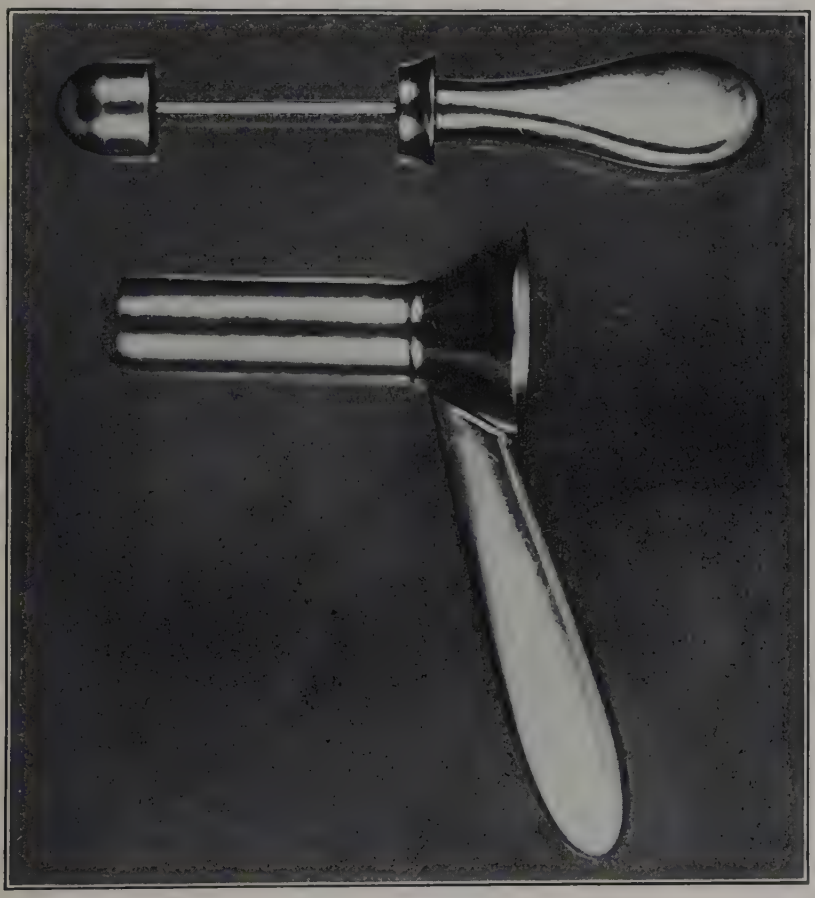


FIG. 83.—ANOSCOPE.

Thus speaks the proctologist and overlooks completely the most common cause of anal fissures in women, namely, childbirth. Every obstetrician has observed hundreds of times when the perineum is distended to the utmost by the descending head, how the anus becomes dilated to an opening almost an inch in diameter through which the anterior wall of the rectum is seen to bulge. At the moment of greatest tension, and particularly if hemorrhoids are present, the mucosa splits in one or more places; and this is the source of fissures which impress themselves upon the consciousness of the patient after the first defecation in the puerperium and remain thereafter

as unwelcome and harassing sequelae to childbirth. Knowing this mode of origin, the proper preventive treatment is self-evident, and for many years I have applied a solution of silver nitrate to these fresh cracks immediately after the completion of the third stage of labor.

If this precaution has been omitted or if the fissure originated outside of parturition, the pain following every defecation is often so great that the patient voluntarily delays bowel action with the result that the inspissated

FIG. 84.—DIGITAL EVERSION OF ANUS.

and hard fecal matter causes all the more pain at the next defecation. Then particles of feces lodge in the rent, an infection occurs, and the irritation produces a spasm of the sphincter, which in its turn causes more irritation so that the ulcer never has a chance to heal. Some bleeding takes place and adds an element of apprehension, and if referred symptoms in the form of frequent and painful micturition or of pain in the lower back from transmission to the sciatic and ileolumbar nerves occur, the little and seemingly insignificant crack in the anal mucosa may become a powerful factor in producing or aggravating neurasthenia. Nor is this all. While Koblanck

considers masturbation as one of the causes of fissures, Kelly, on the contrary, believes that the itching due to fissures may eventually lead to masturbation. Finally, there is a possibility of abscess or fistula formation, and Lynch reasons that even appendicitis may, in its last analysis, sometimes be caused by the constipation engendered by a fissure.

Fortunately, diagnosis and treatment of this condition are easy. The patient lies in left Sims position. The buttocks are separated and the patient is asked to strain; thereby the anus is relaxed and the fissure comes into view as a red, raw abrasion. Where hemorrhoids are present, fissures are frequently found in the sulcus between two hemorrhoidal nodes and are readily exposed by gently pulling the latter apart. In women who have borne chil-

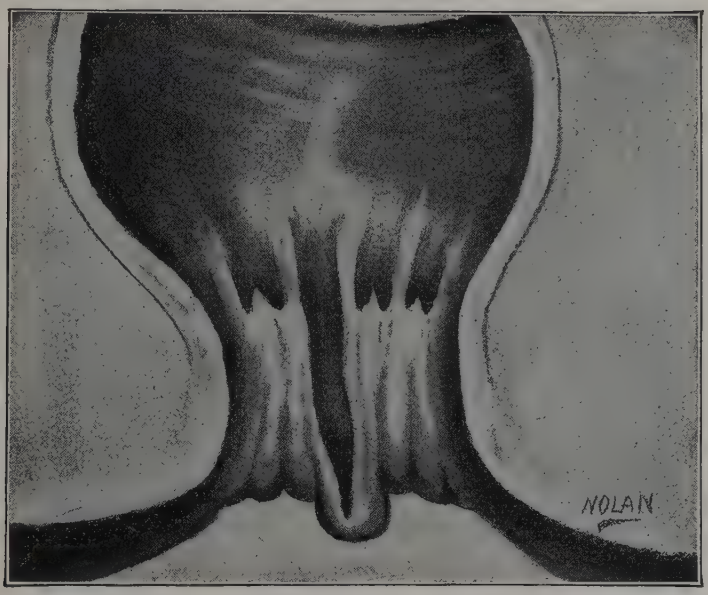


FIG. 85.—ANAL FISSURE RESULTING FROM THE TEARING DOWN OF ONE OF THE CRYPTS OF MORGAGNI WITH THE FORMATION OF A "SENTINEL PILE" (from Hirschman, *Diseases of the Rectum*).

dren, it is easy to visualize fissures by everting the anus digitally (Fig. 84). Digital or speculum examination are unnecessary in most cases, but where it is desired, the fissure should first be anesthetized by any of the ointments to be mentioned presently. By digital examination we can feel the indurated edges of the ulceration, and by speculum examination the full extent of the lesion can be seen. In chronic cases the "sentinel pile" usually indicates the location of the fissure (Fig. 85). A sentinel pile is a thick tag of skin which has been pushed down and out by the infiltration of the tissues surrounding the fissure.

My routine in treating fissures is as follows: At the first consultation, the fissure and the entire anal canal are thickly covered with an anesthetizing ointment on a tightly wound cotton applicator. An ointment which has proved quite satisfactory for this purpose is as follows:

℞	Bismuth. subnitrate (or oxychlorate)..	1.5	(gr. 22)
	Zinc oxid.....	2.2	(gr. 33)
	Sol. adrenalin, 1:1000.....	0.75	(gr. 12)
	Menthol.....	0.4	(gr. 6)
	Cocain. hydrochlor.....	0.75	(gr. 12)
	Lanolin		
	Vasel. alb.....āā qs.	30.0	(℥ 1)

This treatment is given daily, or, better still, the patient herself introduces the ointment several times a day by bearing down upon the little finger which is laden with a goodly supply of the ointment.

At the same time the bowels must be kept open—not by means of a cathartic, but by oil injections through a well lubricated soft rubber catheter. Four or five ounces of liquid petrolatum or any other brand of "mineral oil" serve the immediate purpose best. After each defecation, the anal region should be cleansed with sponge and warm water, gently dried and covered with the above ointment or a 10 per cent boric acid lanolin ointment. Cleansing with toilet paper increases the irritation.

After three or four days of this treatment, the tenderness of the fissure and the spasm of the sphincter have sufficiently subsided to permit of the local application of pure ichthyol at intervals of two days, preceded, perhaps, by the application of a swab moistened with a 1 per cent eucaine solution for four or five minutes; in the intervening days, the patient continues the use of the cocaine ointment. If the silver nitrate stick is used, the applications are made once a week. Careful attention to the bowels should be continued and an anticonstipation régime instituted in addition to the local measures.

In this very simple fashion the vast majority of fissures can be cured very promptly. In fact, I have for years found no rebellious cases that required forcible divulsion of the sphincter under a general anesthetic. Of course, in fissures of very long standing and with markedly thickened edges, nothing but forcible divulsion of the sphincter in narcosis will do; at that time, the fissure may be scraped thoroughly, cauterized and packed with gauze to insure its healing from the bottom up, or the lesions may be excised completely.

Suppositories appear to me illogical in the treatment of fissures as they are placed in the rectal cavity. Their anesthetizing effect from the admixture of cocain, morphin and the like can equally well be obtained by direct local application to the ulcer itself.

Hemorrhoids.—Varicosities of the hemorrhoidal veins of the anus and rectum are always the result of some condition which interferes with easy circulation; a sedentary mode of life, for instance, or an occupation which entails long hours of standing; most common of all, chronic constipation and the habitual use of cathartics; overeating and lack of exercise; cirrhosis of the liver and any other congestion of the portal circulation; cancer of the rectum or sigmoid. In women, pregnancy is a most frequent cause, or retroflexion or a fibroid so located as to impede the return flow of blood.

With such a variety of causes it is, therefore, not sufficient merely to make the diagnosis of hemorrhoids, but it is essential to discover and, if possible, to eliminate the underlying etiology in a given case, for it is obvious that no treatment will be of permanent success if the primary cause is permitted to persist.

External hemorrhoids are located below the anal sphincter and are covered with skin. Internal hemorrhoids originate within the anal canal and are covered with mucous membrane. Hirschman further recognizes an externo-internal variety, a combination of the other two, which is covered by both mucous membrane and skin.

Many people carry hemorrhoids a lifetime without discomfort, but in the majority of cases a multitude of symptoms is complained of, which in some cases may be merely a sense of fullness and weight or a throbbing sensation, in others a more or less constant burning and itching about the anus, and in still others, the most intense pain. Not infrequently painful sensations radiate into bladder and sacrum. The pain becomes acute if internal or mixed hemorrhoids do not slip back after defecation as is the case usually, but remain outside and are constricted by the sphincter. The prolapsed node then increases suddenly in size, a thrombus forms within the pile, and if an inflammation sets in, the anal region becomes edematous. The pain is at times so paroxysmal that collapse may occur. The inflammation may recede; yet, in some cases, suppuration of the hemorrhoidal nodes may take place and if the infection spreads into the neighborhood, serious phlegmons may be the consequence. That fissures are often associated with hemorrhoids has been mentioned above.

Bleeding is a fairly frequent symptom. The loss of blood, as a rule, is slight and gives the patient a feeling of relief, but occasionally the hemorrhage may be persistent and so abundant that a marked secondary anemia, and even death may follow. In every case of bleeding from the rectum, however, the presence of carcinoma higher up must be positively excluded.

The diagnosis of hemorrhoids is not difficult, but must never be made from the symptoms alone. The external variety is visible at once. Internal hemorrhoids are made visible by bearing down on the part of the patient after the rectum has been cleansed with an enema; in women with relaxed pelvic outlet, the digital eversion of the anus will often permit direct inspection. A proctoscope or even a simple Sims speculum will give a good view. Thrombosed hemorrhoids within the anal canal can easily be felt with the finger.

The general treatment of hemorrhoids varies with the underlying cause. In each case, however, the lower rectum should be kept clean by irrigations with normal saline or injections of two or three ounces of cottonseed or mineral oil to which, if necessary, five to ten drops of laudanum may be added. Irrigations or injections must be made through a small soft rubber catheter. Washing the anal region with cold water may also be considered a part of the general treatment.

As to local treatment, the intense itching in milder cases is often relieved by energetic washing with a cold 5 per cent carbolic acid solution. Anspach

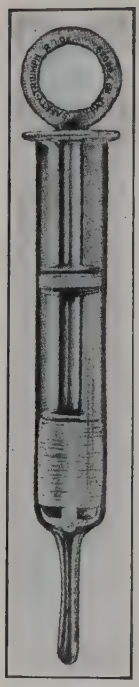


FIG. 86.—GLASS SYRINGE WITH BULBOUS END TO INJECT OINTMENTS INTO THE RECTUM (Randall-Faichney).

recommends an astringent and sedative ointment of the following formula:

℞ Ung. gallae
Ung. stramonii (U. S. P.) āā

Inflamed hemorrhoids require the applications of cold or warm solutions of diluted alcohol, lead water and laudanum, aluminum acetate, witch-hazel, etc. An opium and belladonna suppository (extr. opii. 0.02 (gr. ⅓) extr. belladonnae 0.015 (gr. 1/5), but. cacao 2.0 (gr. 30)) relieves the pain for the time being; the ready-made hemorrhoidal suppositories are much less satisfactory.

Acutely prolapsed hemorrhoids must first be replaced. The reduction is at times difficult and requires great caution. Hirschmann advises to shrink the swollen hemorrhoid by applying compresses of adrenal in solution with ½ per cent chloretone or 1 to 4 per cent eucain, after which reduction is often easy. After replacement, an ointment containing adrenalin and chloretone gr. 20 to the ounce, in lanolin is injected into the anus after stool and three or four times a day through a long-nozzled collapsible tube or an ointment syringe (Fig. 86). For this purpose the ointment recommended above for fissures will also be found very satisfactory. Here is also an opportunity to use astringent and sedative suppositories of any of the following formulae:

1. ℞ Extr. stramonii ..... 0.03 (gr. ½)
Ac. tannic ..... 0.03 (gr. ½)
Plumbi carbonat ..... 0.06 (gr. 1)
Sol. plumbi acet. dil ..... m. 2 (M. 2)
Creosote ..... m. ½ (M. ½)
M. ft. suppository. Insert one at night (Anspach).

2. ℞ Chrysarobin ..... 0.08 (gr. 1⅓)
Iodoform ..... 0.02 (gr. ⅓)
Extr. belladonnae ..... 0.01 (gr. ⅙)
Butyr. cacao ..... 2.0 (gr. 30)
M. ft. suppository. One, two or three times a day (Opitz).

3. ℞ Bismuth. oxychlor ..... 0.1 (gr. 1½)
Zinc. oxydat ..... 0.15 (gr. 2½)
Solut. adrenalin ..... 0.05 (M. 1)
Eucain hydrochl ..... 0.06 (gr. 1)
Menthol ..... 0.03 (gr. ½)
Butyr. cacao ..... 2.0 (gr. 30)
M. ft. suppository. One, morning and evening (Trebling).

The treatment thus far described is purely *palliative*. In practically all instances the subjective discomfort can be relieved but the hemorrhoids remain and may create fresh trouble unless the patient is very careful as to her diet, local applications to the anus, etc. It is, therefore, logical to aim at a complete cure and to remove the piles altogether unless the original cause, such as cirrhosis or rectal cancer, make such an undertaking illusory.

The *curative* treatment consists of either surgical or non-operative means. Of these two, surgical methods are the more popular, and in very bad cases, and quite generally in large external hemorrhoids, the radical removal by any of the accepted methods is, indeed, the best procedure. But surgery in these cases has its drawbacks. A good deal of suffering after the operation is inevitable and there are certain more or less serious complications which cannot always be avoided. In addition there are patients who absolutely refuse to submit to any operation, and, finally, there are cases where any surgical procedure is contra-indicated. For all these reasons, the practitioner will do well to familiarize himself with non-operative methods of cure for which considerable interest is evinced in more recent literature. Of these non-operative methods, the "injection treatment" has largely fallen in disrepute in this country because it has been exploited by quacks. It seems, however, that our leading proctologists are beginning to drop their prejudices.

Lynch describes his technic as follows: "After the patient has been properly prepared and the canal washed out with peroxid of hydrogen, a speculum is introduced and held in place by an assistant. The hemorrhoid to be injected is selected and 3 to 5 minims of a 5 to 10 per cent solution of carbolic acid are injected into the hemorrhoid as the needle is withdrawn. A piece of gauze saturated in alcohol is applied at the site of the puncture and held there for some time to neutralize any phenol that may escape. The patient is instructed to remain quiet for a day, and if the hemorrhoid should prolapse, she is instructed to *return at once*. Five days later another pile is selected, and so on until all have been treated. It is sometimes necessary to inject a hemorrhoid more than once; but by care, patience, and perseverance, the entire hemorrhoidal zone can be obliterated and good results obtained."

Other authors recommend 20 per cent carbolic acid in either alcohol or glycerin. The disadvantages are the possibility of fistulae and phlegmons. Even pyemia and hepatic abscess have followed the phenol injections, and Warbasse considers this treatment "justified only when the patient understands the risk, when an anesthetic cannot be administered and when a surgeon capable of performing a safer operation, cannot be had." Moreover, there is a fairly large percentage of recurrences.

Boas claims to be able to prevent these to a very large extent by using 95 per cent alcohol in the following manner: The patient enters the hospital in the evening and receives a cathartic. The next morning the rectum is cleansed by a copious soap-suds enema. Following this, with the patient in knee-chest position, a Bier suction cup is employed *until all hemorrhoids are outside of the anal opening*. A local anesthetic is now applied, and fifteen or twenty minutes later 2 to 4 to 5 c.c. of alcohol are injected *deep* into the

node by means of a sterilized syringe. In hemorrhoids of medium size, 2 c.c. are injected into the upper pole and the same quantity near the base. The amount varies according to the size but should never exceed 10 c.c. for any one node. The whole procedure requires but a few minutes even if there are numerous varicosities. The injection is followed by reposition which is easy, and usually spontaneous in moderately sized or solitary nodes. With very large and multiple hemorrhoids, however, this act is not always easy and must sometimes be repeated the next day. By covering the anal region with vaselin or the like, the skin is not drawn into the rectum during the reposition, a fact which prevents painful irritation. The after-treatment consists of rest in bed and liquid diet for four days. A daily dose of paregoric keeps the bowel quiet. Anodynes are but rarely needed. A cathartic on the fourth or fifth day produces an evacuation which almost always is painless. If one or more nodes again prolapse, they must be reduced. If the first defecation has taken place without such prolapse, Boas claims that the treatment will be a permanent success. The diet may now be general and the patient is permitted to leave the bed for a short time and walk about on the following days. The length of the entire treatment in uncomplicated cases is from ten to fourteen days. The injected nodes at this time can still be felt by digital examination as hard, irregular prominences, but four to six weeks after the treatment the anal mucosa is perfectly smooth. Recurrences are observed with this as with any other, even the operative method, but the freedom from pain and absence of traumatism to mucosa or sphincter recommend a trial.

For internal piles in which no fibrous changes have taken place, Sigmond suggests electrolysis. This treatment requires a good galvanic outfit and a special needle which is prepared as follows:

1. Take an ordinary cambric needle and insulate it by winding silk thread around it from one fourth inch from the eye to within one fourth inch of the point.

2. Stick the point of the needle into a cork for about one eighth of an inch, thus leaving one eighth of an inch above the cork.

3. Shellac the needle from the upper end of the thread down to the cork, thus leaving the part above the thread unshellacked and uninsulated to fit into the needle holder. The part in the cork is also uninsulated. After the shellac has thoroughly dried, remove the needle from the cork, and it is ready for use.

"The pile is exposed in a speculum which is held by an assistant, and injected with a local anesthetic (novocain or quinin and urea). After a few minutes, the negative pole is attached to a large moist pad and strapped to the abdomen so as to make and keep good contact, thus assuring one of a steady current, because if the current breaks it is uncomfortable to the patient. Attach the positive pole to the needle and insert the needle in the pile. Insert it into the top of the pile, carrying it up to the thread; thus the uninsulated point is in the pile. The idea of the thread is to make a shoulder, to prevent inserting the needle too deep. Use about 10 or 15 milliamperes until the pile shows a decided blanching or ashy appearance.

Puncture the pile as near the top as possible because injection too close to the base causes after-pain.

"Treat each pile separately, using a new needle for each pile because the positive pole causes the needle to roughen and deteriorate, and thus it will break off when used the second time. A good way is to treat one pile at a sitting though some treat all of the piles at one time." This, Sigmond believes, causes too much strain on the patient, whereas by treating one pile at a visit, no inconvenience is experienced. Relief of the hemorrhoidal discomfort may be expected about the third day.

Sigmond claims for this method, with which I have had no personal experience, excellent results and further points out that it does not confine the patient to bed, avoids the chance of an infection and the danger of an anesthetic.

An extremely simple method for which its originator claims a satisfactory experience of several years has recently been recommended by Lyth. Given a bad case, says this author, with a ring of prolapsed piles surrounding the anus, some perhaps denuded of epithelium, intensely and agonizingly tender, bleeding on defecation, and continually discharging blood-stained mucus which stains the linen and renders the patient's life a burden, the procedure is as follows:

1. The bowels must be made to move the last thing at night before retiring. Most people are in the habit of evacuating the bowels in the morning, but Lyth considers defecation at night essential and wants it brought about by suitable aperients.

2. A loose bowel action, however, must be avoided, and a mild degree of constipation is preferable to diarrhea.

3. After defecation and after gentle sponging with tepid water, calamine powder is to be applied in the following way: it is to be freely and thickly applied, not merely sprinkled, on a sanitary gauze pad. About two teaspoonfuls are placed on the exact part of the pad which will remain in contact with the piles when the tapes are tied around the waist. It is necessary that the pad should be pulled firmly up in position.

If there is much discharge, the pad is changed in the morning and fresh calamine applied. At first while there is still too much discomfort, unguentum hamamelis or unguentum gallae with opium may be applied thickly on the pad worn during the day, but is to be changed for the powder at night.

In two, or at the latest three, weeks the piles are sufficiently shrunken, dried and painless to dispense with the pad in daytime. Internal piles which have prolapsed on defecation, are also coming in contact with the calamine before their gradual return during the night and, subjected to its astringent action, are becoming smaller and less sensitive.

After two or three more weeks, the piles are not so apt to prolapse; those that do are easily replaced or even retract spontaneously. The powder and pad may then only occasionally be applied if necessary. The relief is permanent if the patient practices suitable exercises and observes a limited diet. Cases with portal obstruction, pregnancy or growths are, of course, excluded.

Summing up, the practitioner has, aside from purely palliative measures,

at his disposal a number of non-operative methods which promise good results. These require attention to details and acquisition of skill. They cannot be said to be superior to surgical methods, but they may be preferable where there exist clear-cut contra-indications to operation or where the patient steadfastly objects to surgical intervention. Neither operative nor non-operative methods are entirely proof against recurrences, but the number of these may be greatly decreased by paying attention to the underlying cause of the hemorrhoids.

LITERATURE

Urinary Tract

Bokay. Journ. Am. Med. Assoc., 1922, 78: 987.
Carter. Arch. Pediatrics, May, 1921.
Eden and Lockyer. Gynaecology, New York, 1920, ed. 2.
Koblanck. Taschenb. d. Frauenheilk., 3d ed., Berlin and Wien, 1921.
Opitz-Menge. Handb. d. Frauenheilk., Wiesbaden, 1913.
Scholz. Therap. d. Gegenw., 1919, No. 1.
Sherrill. Am. Journ. Obst., 1913, 68: 1150.

Rectum

Anspach. Gynecology, Philadelphia and London, 1921.
Boas. Deutsche med. Wchnschr., 1919, 45: 1153.
Hirschman. Handbook of Diseases of the Rectum, St. Louis, 1919.
Leavitt. New York Med. Journ., 1914, 99: 429.
Lynch. Diseases of the Rectum and Colon, Philadelphia and New York, 1919.
Lyth. British Med. Jour., 1921, 1: 265.
Opitz. In Menge-Opitz, Handb. d. Frauenheilkunde, Wiesbaden, 1913.
Sigmond. Am. Journ. Electrotherapy and Radiology, June, 1921.
Trebling. München. med. Wchnschr., 1916, 38: 230.

CHAPTER IX

DISTURBANCES OF FUNCTION AND SYMPTOMS OF DISEASE

In the preceding chapters the most important facts regarding the principal affections of the genital organs have been presented: the various manifestations have been described and explained on the basis of pathologico-anatomical alterations; diagnostic means have been suggested and differentiations from other diseases pointed out; finally, therapeutic hints have been offered, in so far as they are within the scope of this book and suited to the needs of the general practitioner.

This systematic exposition is appropriate in a textbook and required for a thorough study of the subject. In actual practice, however, the mode of attacking the problem is quite different. The patient does not come labeled with this or that diagnosis. It is the task of the physician to assign her case to one or another category and to treat her accordingly. What the patient tells him constitute merely symptoms. She may believe that when she complains of sterility, for instance, or of amenorrhea, that she is naming a disease, a diagnosis, but in reality—and this cannot be repeated too often—she is only stating a symptom.

It, therefore, becomes necessary to imitate, in the following chapters, the actual course of events as they take place in our consultation rooms: to start our investigation from the symptom or symptoms complained of, to recognize the existing disease with the means at our disposal, and then to institute the logical treatment.

It is with this end in view that a number of the most prominent symptoms are analyzed in the following. This will also give me an opportunity to fill in certain gaps which appear in the preceding chapters.

BLEEDING

The History.—It is important to determine the *type* of bleeding and to find out whether it is periodical and associated with the normal menstrual flow (menorrhagia), or occurring at irregular intervals and unrelated to menstruation (metrorrhagia). The patients themselves call every bleeding from the genitals a "period." The physician must inquire into the exact date the bleeding began and the duration of the free interval in order to arrive at the correct classification, but often a definite differentiation is impossible.

Menorrhagia.—This means an excessive amount of the menstrual flow or an undue prolongation of the ordinary menstruation beyond its normal limits, or a combination of both. The causes, to mention only the more

common ones, are: acute adnexal disease, fibroids, retrodisplacements, subinvolution, endometritis, hyperplasia and hypertrophy of the endometrium, cystic ovaries, endocrine disturbances (ovarian hyperfunction, chlorosis, hyperthyroidism, etc.).

Occasional causes are certain factors which produce a hyperemia of the endometrium, for instance, dancing, sexual intercourse, etc., during menstruation; also chronic congestion, due to masturbation or coitus interruptus; further, changes of climate, or exposure to cold. Of general diseases, cardiorenal or liver affections predispose to increased menstruations. Of these and certain acute infectious diseases we shall speak later.

Metrorrhagia.—The cause of metrorrhagia is, first and foremost, malignant growths irrespective of their location in the genital tract, cervical polypi, acute inflammations of the vagina or uterus, senile vaginitis, injuries (criminal abortion), hymenal lacerations, etc.

Accidental causes are various traumatisms which, however, produce bleeding *only if the mucosa is abnormal;* cohabitation, vaginal douches, digital examination, straining at stool, heavy work (lifting, carrying), if followed by bleeding, presuppose a hyperemic mucosa, that is, a new growth, an ulceration, or, perhaps, a pregnancy.

A separate position in the category of metrorrhagia is occupied by the climacteric hemorrhages which occur about a year after the menopause. They are due most frequently to carcinoma, less often to senile changes in the vagina, to necrotic fibroids or to atheromatosis of the uterine blood-vessels.

Uterine hemorrhage.—Hemorrhage from the uterus in the reproductive age which occurs after the patient has missed one or more menstruations, is usually due to disturbances of pregnancy (abortion, extra-uterine pregnancy).

Gynecologic Examination.—This is the next step towards the diagnosis. It must not be delayed until the bleeding has ceased, even if the patients object. Not only would valuable time be lost in the case of a malignant new growth, but certain conditions can be better diagnosed only *during* the bleeding, for instance, submucous fibroids, because then the cervical canal often opens sufficiently to admit the examining finger. The appearance of the blood itself may afford valuable diagnostic hints (see below). We proceed to determine the organ which may be the source of bleeding, in the following order:

The Vulva.—After excluding the bladder (if necessary, by catheterization) and the rectum (hemorrhoids) as the source, direct inspection reveals the origin of any bleeding in the vulva. Aside from injuries, urethral caruncles, and, in pregnant women, varicosities, may give rise to bleeding; further, ulcerative processes of carcinomatous, tuberculous, or syphilitic nature.

The Vagina.—By digital examination the presence of a tumor, such as carcinoma, sarcoma, or gumma, is discovered. If there are no palpable changes, the inspection through a speculum may reveal the typical appearance of senile vaginitis.

The Cervix.—By digital and speculum examination the source of bleeding from the cervix may be discovered in a carcinoma, erosion, or various

ulcerative processes (tuberculosis, syphilis, etc.). Occasionally, a small mucous polyp may be visible in the external os and suggest the presence of other polyps in the uterine cavity.

If the appearance of the cervix in the speculum is normal, the bleeding probably comes from the uterine cavity, though adenocarcinomata of the cervix may occasionally lie hidden behind an entirely normal external os.

The Uterus.—Uterine bleeding is by far the most frequent of all genital hemorrhages. A thorough palpation of the organ may enable us to determine the cause. The size, consistence, and position of the uterus will help in the diagnosis.

Enlargement of the uterus suggests fibroids, carcinoma, subinvolution. A normal size, however, does not exclude the possibility of a submucous fibroid or beginning cancer.

Enlargement and softness of the bleeding uterus calls our attention to some disturbance of pregnancy: abortion, placenta praevia, ectopic gestation, etc.

Displacement of the uterus causes bleeding only in the case of a retroflexion. The mechanism of the process has been discussed fully in Chapter V.

If no appreciable changes about the uterus can be found by bimanual palpation, the introduction of the uterine sound may be permissible. While an experienced specialist may occasionally succeed, by using the sound, in feeling a roughening of the mucosa, the practitioner, as a rule, will not gain much. Moreover, the distinction between a malignant or benign condition of the uterine mucosa requires an exploratory curettage in any case. In this connection, it should be remembered that the *entire* uterine cavity and cervical canal should be curetted and that *all* the scrapings be examined microscopically. If the first stroke of the curet brings large particles to light, the operation need not be continued. If there is a dirty or purulent discharge from the uterus in the free intervals between bleedings, curettage should be omitted because of the danger of infection. Where there is suspicion of retained placental tissue as the cause of bleeding, dilatation and "finger curettage" is far preferable to instrumental curettage.

If the uterus itself can be excluded, the adnexa, the peritoneum, and the parametria must be considered as possible causes.

As to the adnexa, acute *salpingitis,* particularly in the stage of pyosalpinx, very commonly causes prolonged, profuse, and too frequent menstruations; at times the type is more that of a metrorrhagia; exacerbations of the tubal infection lead to recurrences of the bleeding. A tube enlarged by extrauterine pregnancy causes uterine bleeding as soon as the ectopic fetus dies. There is at first an expulsion of the uterine decidua with more or less bleeding, and as the tubal pregnancy terminates in tubal abortion and hematocele, more or less continuous hemorrhages occur from the uterus. The blood comes from the congested uterine mucosa, not from the tubes as is so often assumed erroneously.

Macroscopic changes in the *ovaries* are not frequently responsible for uterine bleeding. The ordinary ovarian cysts produce neither menorrhagia nor metrorrhagia. Bilateral malignant tumors, however, acute inflammations,

and the so-called small cystic degeneration may give rise to uterine hemorrhage.

An acute or recurrent *pelvic peritonitis* is usually associated with some rather irregular bleeding. The same is true of parametritis. In both these conditions the uterus, of course, is implicated in the inflammatory process and the cause of bleeding, in its last analysis, is an acute or chronic endometritis.

Obscure Causes.—If the systematic and searching examination of the genital tract has shed no light on the question, we are confronted with the difficult task of explaining these hemorrhages in the absence of any gross physical abnormality.

At the present state of our knowledge this task often remains unsolved.

Adolescent Hemorrhage.—There are certain clinical varieties of uterine hemorrhage which may be discussed under this head. Adolescent hemorrhage, whether in the form of menorrhagia or metrorrhagia, is not infrequent in young girls from twelve to sixteen years of age. The bleeding may be very severe and may induce great anemia or even cause death. That in these cases a disturbance in the endocrine system is the primary cause cannot be doubted. In most instances we must assume that a hyperfunction of the ovaries is at fault; in others a hyperthyroidism or a hyperpituitarism stands in the foreground.

Climacteric Hemorrhage.—In the chapter on cancer emphasis has been laid on the necessity of ascribing all hemorrhages at or near the menopause to malignancy until absolute proof has been furnished to the contrary. There are, however, instances in which malignancy or other abnormalities (fibroids, polyps) can be excluded with certainty. In these cases excessive hemorrhages alternate with periods of amenorrhea, sometimes of considerable duration, and there are also typical climacteric symptoms (flushes, edemas, vertigo, headaches). Formerly, atrophy of the mucosa and insufficiency of the uterine musculature, combined at times with degeneration of the vessel walls, were cited as the causes of this form of bleeding. To-day we are more inclined to ascribe the phenomenon to a temporarily disturbed equilibrium of the endocrine system brought about by the dysfunction of the ovaries which are about to leave the association of the glands of internal secretion. The subject has been dealt with on page 163.

Solitary Profuse Hemorrhages.—These occur at times as the first menstruation after labor or miscarriage or any long amenorrhea due to other causes. In other instances, a psychic shock, fear, sudden change of temperature, the effect of chilling, baths, unhygienic behavior during menstruation, etc., may bring on a single abundant hemorrhage either at the period or between the menses.

A regular repetition of these hemorrhages, that is, a *true menorrhagia,* may occur when the uterus is too flabby, or not sufficiently involuted after pregnancy. Because of this relatively insufficiency of the uterine musculature, women who have borne a number of children in quick succession quite generally have more profuse menses than nulliparous women.

Acute or chronic hyperemias of the uterus may give rise to menorrhagia.

Too frequent sexual excitement (in newly weds), cohabitation without final orgasm (impotence of the husband, coitus interruptus, etc.), masturbation, sensuousness intensified by obscene literature, machine sewing, mental overwork, chronic constipation, etc. belong in this category. The active hyperemia can at times be discovered in the highly reddened appearance of the vagina and cervix. Hemorrhoids and other signs of congestion testify to the passive hyperemia.

Ovarian Hemorrhages.—In this chaos of obscure genital hemorrhages, the study of endocrinology has brought some order, and it seems plausible to explain most of these atypical menorrhagias and metrorrhagias as *ovarian hemorrhages*. Just as the normal menstruation is due to the normal function of the ovaries, so are its abnormal variations caused by an abnormal, that is, an excessive function of the ovaries. Whether it is permissible, as Aschner believes, to ascribe *all* uterine hemorrhages, except those caused by pregnancy or malignant neoplasms, to ovarian hyperfunction must be left to more extended research. The juvenile hemorrhages, at any rate, and the climacteric and preclimacteric hemorrhages as characterized above are due to this cause. It is also possible that during the period of sexual maturity a number of obscure hemorrhages owe their origin to disturbances of the ovarian function or of the entire endocrine equilibrium, but in most cases our knowledge in this respect is largely speculative.

Internal Diseases.—In a small percentage of cases of genital hemorrhages without objective findings, *internal diseases,* some of which are mentioned below, furnish an etiologic explanation:

1. Acute infectious diseases which probably affect the endometrium at the same time, such as influenza, typhoid, scarlet fever, articular rheumatism, malaria, etc.

2. Diseases with a general tendency towards bleeding, such as purpura, hemophilia, scurvy. Not long ago Herrmann reported a case of fatal bleeding in purpura. In this connection, syphilis may be mentioned as an occasional cause of metrorrhagia. A unique case of fatal menorrhagia in a girl of seventeen years was recorded by Eufinger as being due to diabetes, a disease which ordinarily leads to amenorrhea or oligomenorrhea.

3. Diseases leading to congestion in the veins of the abdomen, for example, cardiorenal disease, cirrhosis of the liver, emphysema.

The diagnosis of the cause of the bleeding may occasionally be aided by the character of the discharged blood. The menstrual blood is usually thin and of a bright red to a dark brown color. Coagulation is hindered by a ferment produced in the endometrium under the influence of the ovaries and by the alkaline reaction of the uterine secretions. Coagulated blood is always abnormal.

Coagulation may occur in endometritis, fibroids, carcinoma, polyps, and abortion. When the blood is of a dark, brownish-red color it is inferred that the passage of the blood has been obstructed, giving time for coagulation within the uterine cavity. When mucus is intimately mixed with the blood it indicates an involvement of the cervix from cervical catarrh, polyp, carcinoma, or sarcoma. A watery discharge more or less deeply stained with

blood is often a precursor of hemorrhages in carcinoma. The fetid odor of blood is suggestive of necrotic processes in the genital tract (cancer, fibroid, abortion).

Blood of a syrupy consistence is supposed to have remained a long time in the uterine cavity. Tissue fibers mixed with the blood suggest the presence of degenerated new growths.

Therapy.—"Correct diagnosis is the key to correct treatment," and as soon as we have determined a tangible cause of the bleeding, we should have no difficulty in selecting the appropriate remedy. Yet how often this simple and logical principle is violated in daily practice! The unfortunate tendency in many physicians to treat before finding out what there is to treat, often leads to the thoughtless and mechanical administration of ergot or the recommendation of a curettage, and I feel that I would fail in my duty if I did not again and again warn against curettage as a routine measure.

As to the treatment of hemorrhages caused by well defined lesions, therapeutic suggestions are given in the respective chapters and need not be repeated here. We are in this chapter more particularly concerned with the treatment of hemorrhage in those cases in which we have been unable to discover a satisfactory pathologico-anatomical explanation.

Not every case necessarily requires treatment. A young girl who has her first menstruation and with it a hemorrhage, merely needs to be put to bed and be kept quiet and her bowels kept open. Similarly in advanced cardio-renal disease with hypertension, the hemorrhage need not be checked because in this case, as Whitehouse points out, it may actually be beneficial to the economy.

Where, however, the menorrhagias occur month after month in juvenile patients without objective cause, treatment should be as follows:

General.—As most of these adolescent patients are chlorotic or anemic or generally hypoplastic, a generally hygienic régime, a change of climate, interruption or reduction of school work, wholesome but not highly seasoned food, etc., often suffice to restore conditions to normal.

Medicinal.—Iron and arsenic are of proved value. Ergot and hydrastis which are so very useful in uterine relaxations after pregnancy and in a good many other hemorrhages with tangible basis are generally unsatisfactory in adolescence though a short trial may be given.

℞ Fluid extr. ergot
Fluid extr. hydrastis .....āā 30.0 (℥ 1)

S.: Ten to twenty drops every two hours until an effect is produced.

Stypticin (cotarnin hydrochlorate) has been enthusiastically recommended for these juvenile menorrhagias. I do not find the drug uniformly reliable but make frequent use of it. In hospital work, intramuscular injections of ¾ grain are given daily; in office practice, it is often combined with hydrastinin.

℞ Stypticin..... 0.065 (gr. 1)
Hydrastinin hydrochlor ..... 0.032 (gr. ½)
M. ft. capsula No. 1

S.: One capsule three times a day for a week before the menstruation and during the flow.

The coagulability of the blood may be increased by the intramuscular or subcutaneous injection of horse serum procurable under various trade names (coagulose, thromboplastin, clauden, etc.), though the possibility of an anaphylactic shock in persons previously treated with dipththeria antitoxin may have to be considered. Weil uses diphtheria serum by intramuscular and subcutaneous injection and also local in vagina and uterine cavity by means of gauze strips soaked in the serum. Mayer has seen good results from the injection of the serum of normal pregnant women. Berkeley and Bonney indorse Blair Bell's suggestion to use calcium lactate according to the following formula:

℞ Acid. lactici..... 40.0 (℥ 10)
Calc. carbon..... 10.0 (℥ 2½)
Chloroform..... 1.0 (m. 15)
Aq. dist.....q.s. ad. 500.0 (0.1)

S.: Two tablespoonfuls every night or every other night.

I have given calcium lactate in 15 grain doses three times a day for a week or two prior to menstruation and had the impression that the bleeding was lessened in a number of cases.

Sometimes a combination of the drugs already mentioned may yield results. Berkeley and Bonney suggest several formulae of which I quote the following:

℞ Extr. ergot. liqu..... 2.0 (℥ $\overline{ss}$)
Extr. hamamelis liqu..... 1.0 (m. xv)
Extr. hydrastis liqu..... 1.0 (m. xv)
Acid sulph. dil..... 0.12 (m. ii)
Aquae.....q.s. ad. 30.0 (℥ i)

℞ Ergotini..... 0.065 (gr. 1)
Cannabin. tannat..... 0.032 (gr. ½)
Hydrastin. hydrochlor..... 0.015 (gr. ¼)
Fiat pillula

S.: (for either). This dose three times a day after meals.

In some few cases it has proved of advantage to reduce the blood-pressure so as to affect the bleeding. Thus, Sturmdorf recommends aconit, nitroglycerin, atropin, and even opium, and Focke has had occasional results from digitalis.

Where these and other styptics and the general régime outlined above fail, organotherapy should be tried. Assuming that these juvenile menorrhagias owe their origin to ovarian hyperfunction associated with a hasty and excessive maturation of follicles, extracts of the corpus luteum should, theoretically, be the best antagonist. As a matter of fact, satisfactory results have frequently been reported. Aschner quotes, for instance, Landsberg, who cured all of his seven cases by this means. One c.c. of the extract was injected subcutaneously every other day; the number of injections ranged between six and twelve. The patients were observed for two or three more months and had regular and normal menses.

Other endocrine extracts were administered more or less empirically. Thus, thyroid extract by mouth was followed by cessation of the bleeding in some cases. Adrenalin by subcutaneous injection has been tried with at least temporary result. Better still was the effect of extracts of the posterior lobe of the pituitary body which are marketed under various trade names (pituitrin, pituglandol, infundin, hypophysin, etc.). Aschner presents an extensive literature on the subject in his book. Of other recent writers, I mention Deutsch, who made fifteen to twenty injections of 1 c.c. of pituglandol at intervals of one to three days. In a few cases, this course of treatment had to be repeated after a pause of a few weeks. The bleeding ceased fairly promptly and the menses became normal as to amount and duration. The general condition likewise improved; headaches decreased, the complexion appeared better, the tone of the musculature became stronger, and there were no bad by-effects. The report by Stickel and Zondeck deserves attention. These authors treated by means of organotherapy sixty-seven cases of hemorrhages of puberty in which no cause other than excessive ovarian function could be considered etiologically. Of these, 60 per cent were cured, about 20 per cent were improved, and about 21 per cent were not influenced. They found the extracts of the pituitary body most potent, but had results also from extracts of the thymus, the thyroid, the ovaries with or without a corpus luteum, the epiphysis, and even the testicles. From this they concluded that there is no specific effect of organotherapy in this class of cases and that the results obtained are probably due to a kind of protein therapy. A very similar conclusion had been reached before by Halban and Koehler. "It is unfortunate," says Novak whose monograph on menstruation is warmly recommended to the reader, "that we cannot be more explicit in suggestions as to the organotherapy of this exceedingly important type of hemorrhage, and that our efforts to attack it along what seems to be rational lines, have not met with a greater measure of success."

Local.—External application of ice to the abdomen or prolonged and very hot douches have been recommended. I have seen no results from the former and have never resorted to the latter as the cases in question are in young girls with intact hymen. Where the bleeding is of alarming proportions and something has to be done at once, the integrity of the hymen may have to be disregarded and the vagina firmly packed in narcosis, but the procedure, which after all is only of very temporary advantage, has its drawbacks.

As a method of last resort, radiotherapy may be tried. Taken as a whole, the intra-uterine application of radium in these virginal patients is rather objectionable. Yet in one case where absolutely every means, including X-rays, and even curettage had been tried and the secondary anemia had reached an alarming degree, the nineteen-year-old girl was cured *promptly* by intra-uterine radium treatment. Generally, however, X-ray treatment will be found to be easier and equally efficacious. In both methods, the object is to eliminate the ovarian function by destruction of the follicles. A case which had baffled all my efforts for more than a year finally yielded to X-ray treatment, though in view of the age of the patient, a girl of sixteen, I made up my mind only with a heavy heart. Fortunately, in young ovaries follicles are not easily destroyed by irradiation, and in these two patients, the menses returned in a perfectly normal fashion eight and eleven months, respectively, after the treatment. Considering the fact, however, that the escape of some of the primordial follicles from the effect of irradiation cannot be taken for granted, the suggestion made by Mansfeld and Pope, independently of each other, to expose only one ovary to X-ray treatment, deserves attention and trial. Both these authors claimed that, in the majority of the cases, the menstrual function became regulated within a few months.

A very interesting development was inaugurated by Stephan in 1920 who found that exposure of the spleen to the X-ray increased the coagulability of the blood. Nuernberger applied this principle in the treatment of metrorrhagia due to adnexal inflammation and cured eighteen out of twenty-five cases. He also quotes Wolmerhaeuser and Eufinger who checked hemorrhages of puberty in two cases by irradiation of the spleen.

From what has been said as to the probable cause of menorrhagias in adolescence, it must be perfectly clear to the reader that curettage has no place whatever in the treatment. It is simply this, that there is nothing in the uterus that need be removed, and for this reason the intervention is altogether unsuccessful. If very occasionally the uterine scrapings should exhibit hyperplastic changes, the curet does not attack the evil at its root: it is the hyperfunction of the ovary which is at fault and will presently be operative again to create a new hyperplastic endometrium. It is nothing extraordinary to read in literature or to hear in private conversation of patients who have been curetted five, six, or more times—always without lasting benefit. Moreover, the curettage has so many potential dangers in its train that the use of the instrument should be strictly limited to the instances where it is really indicated and can do a great deal of good.

In former years, hysterectomy had to be resorted to occasionally when all other means had failed and the condition of the patient became threatening. I am glad to say that I have never been in the unenviable position of having to extirpate the uterus in a young girl at the threshold of her sexual life, and since the advent of radiotherapy, this necessity will hardly ever arise.

To sum up, the treatment of menorrhagias in puberty without apparent physical causes consists of:

1. Means to check the bleeding for the moment.

(*a*) By drugs.
(*b*) By organotherapeutic preparations.
(*c*) By mechanical means.
(*d*) By radiotherapy.

2. Means to prevent the return of the hemorrhages by a general hygienic régime.

Our attitude is entirely different towards hemorrhages before or after the change of life. As has been remarked repeatedly—and cannot be insisted upon too often—preclimacteric and climacteric hemorrhages may be, and very often are, malignant in origin. Hence, the *first* thing to do will be a curettage in the case in which our examination has failed to supply us with a satisfactory explanation. The curettage will be of diagnostic value if the case turns out to be malignant, and very often curative if the trouble merely consisted of a polyp, or a thickened mucosa. Very many of these cases belong in the category of chronic subinvolution and are characterized by an enlargement of the uterus and thickening of the mucosa.

Only after the microscopic examination of the scrapings has excluded the presence of malignant changes may styptics be employed. Intra-uterine cauterization may likewise be tried. Gerstenberg recommends pure formalin solution unreservedly. He uses two thin applicators tightly wound with cotton which are kept in the solution at least ten minutes. The cervix is grasped with a volsellum, and the first applicator introduced. This is withdrawn within a few seconds before the uterus contracts. When the sensation of contraction has completely subsided, the second applicator is introduced and more thoroughly brought into contact with the entire uterine mucosa. The whole procedure requires fifty seconds. At times there is more bleeding after the first application—a sign that not enough formalin has been used. After the treatment, the vagina is carefully dried (to prevent necrosis) and a tampon with string placed before the external os for several hours, up to twelve. The patient remains in bed for two days with an ice-bag on the lower abdomen. The cauterizations may be repeated three or four times at weekly intervals.

Sturmdorf uses acetone or 16 per cent formaldehyd solution which may cautiously be injected into the uterus daily for some time. Goffe prefers nitric acid locally to destroy the bleeding endometrium.

I had several remarkable results with the method of Spaeth who melts equal parts of antipyrin and salol in a test tube over a Bunsen burner and applies this mixture as hot as possible by means of a cotton applicator.

While all these internal or local remedies are more or less beneficial and have their place occasionally in order to tide a patient over debilitating attacks, they have one and all been superseded by radiotherapy. Of the latter, intra-uterine radium treatment is preferable to X-ray therapy and represents at present the sovereign method in combating these climacteric hemorrhages which by using from 1,200 to 1,500 mg. hrs. can be checked in almost 100 per cent of the cases. Lest there be any misunderstanding, let me repeat that I am speaking here only of the so-called functional hemorrhages for which no specific cause can be discovered. The hemorrhages at this period

which are caused by fibroids, for instance, need special consideration which has been discussed in Chapter VI.

The radium treatment as just outlined has been a blessing to womankind in still another respect. There used to be many a case in which, local or medicinal treatment having failed, hysterectomy had to be done to save the patient's life. It is a different matter whether a diseased uterus has to be removed or an apparently normal uterus which bleeds merely because of an endocrine upset. In the first case, the seriousness of the local malady justifies any operative risk, particularly in the case of malignancy; in the second case the remedy—for there is still a certain mortality and considerable morbidity in hysterectomy—is almost as serious as the condition for which it is applied. To-day we are able, fortunately, to cure these uncomplicated cases in a manner practically free from pain and danger.

We now come to the treatment of hemorrhages in the sexually mature woman.

The majority of menorrhagias in this class of patients is secondary to some acquired disease, usually of an inflammatory nature, which, as a rule, can be diagnosed without undue difficulty. The proper treatment follows as a matter of logical conclusion. There are, however, enough cases left where such objective signs are lacking. In these we may have to think of, and search for, general and so-called constitutional causes, for instance, diabetes, hemophilia, etc. Only recently a woman of thirty-nine was referred to me for operation for cancer of the uterine body. There was nothing to justify this assumption, but a careful general examination elicited an advanced cardio-renal disease as the cause of the bleeding. In other cases of obscure etiology, there may be sexual overexcitement, masturbation, coitus interruptus, etc. It is self-evident that our therapy in such instances should be causative and that curettage or styptic remedies would be worthless.

Metrorrhagia in the sexually mature women almost always indicates a local disease within the genital sphere. If the practitioner is unable to find such a primary cause, it would be wiser to ask for a consultation with a gynecologic specialist than to treat the bleeding symptomatically by drugs such as enumerated above. Cancer may be at the bottom of many a continuous hemorrhage without local physical signs even in young women. Other things being equal, the curet is much more often indicated in these cases than in hemorrhages in puberty.

An interesting though rare observation may be quoted from Quisling before closing this chapter. A girl of twenty, who had been menstruating regularly and moderately since her fifteenth year, had been troubled with menorrhagia for the last twelve months. Secondary anemia was pronounced. Medicinal treatment was of no avail but curettage brought about a cure. Microscopically, the endometrium showed adenomatous hyperplasia. The real cause of the condition was that her work compelled this girl to *stand* for ten hours every day.

Further suggestions for the symptomatic treatment of uterine hemorrhages may be found in Chapter VII.

LITERATURE

Aschner. Die Blutdruesenerkrankungen des Weibes, Wiesbaden, 1918, 58.
Benthin. Med. Klin., 1922, 18: 99.
Berkeley and Bonney. A Guide to Gynaecology, London, 1919, 50.
Deutsch. Zentralbl. f. Gynäk., 1914, 38: 545.
Eufinger. Monatschr. f. Geburtsh. u. Gynäk., 1922, 58, No. 1.
Findley. Diseases of Women, 1913, 33.
Focke. Therap. d. Gegenw., 1914, 55.
Gerstenberg. Zentralbl. f. Gynäk., 1914, 38: 120.
Goffe. Med. Rec., 1913, 84: 867.
Herrmann. Zentralbl. f. Gynäk., 1922, 46: 1648 (with literature).
Mayer. Discussion, Zentralbl. f. Gynäk., 1914, 38: 239.
Novak. Menstruation and Its Disorders, D. Appleton & Co., 1922.
Nuernberger. Zentralbl. f. Gynäk., 1923, 47: 19.
Quisling. Tidsskrift f. d. norske laegeforening, 1916, 36: 489.
Spaeth. Zentralbl. f. Gynäk., 1904, 25: 397.
Stickel and Zondeck. Ztschr. f. Geburtsh. u. Gynäk., 1922, 85, No. 1.
Sturmdorf. Tr. Med. Soc. New York County, December 22, 1913.
Weil. Gynécologie, Paris, May, 1913.
Whitehouse. In Obstetrics and Gynaecology, ed. by Fairbairn, 1921, 487.
Winter. Gynaekologische Diagnostik, Leipzig, 1907, 581.

CHAPTER X

DISTURBANCES OF FUNCTION AND SYMPTOMS OF DISEASE
(Continued)

AMENORRHEA

Amenorrhea is the absence of menstruation in the sexually mature female for at least several months. Oligomenorrhea is the abnormally scant menstruation and may be considered together with amenorrhea because both phenomena have much the same etiology and clinical dignity. The definition of "scantiness" and "abnormal scantiness" is rather arbitrary and is left to individual judgment, unless there exists sterility and the patient states that her menstrual flow has become perceptibly less.

Amenorrhea being merely a symptom, it is incumbent upon the physician to discover the specific cause in a given case in order to select the rational therapy. The practitioner, therefore, will do well to bear in mind that amenorrhea may be either physiologic or pathologic; in the latter event he will have to search for possible local, general, or functional causes.

Physiologic Amenorrhea.—Normally, menstruation is absent before puberty, after the menopause, during pregnancy, and in about one half the cases also during lactation. The beginning of the menstrual life in our climate is around the fourteenth year, the occurrence of the climacterium is about the age of forty-five. Both figures, however, are merely averages with wide individual latitudes. Thus, a girl may not begin menstruating until the age of sixteen and yet be perfectly healthy. A woman may enter the menopause anywhere between forty and fifty and still be normal.

At the outset of adolescence, it is quite common for a girl to have one or more regular menstruations and then not to menstruate again for a year. Anxious mothers should be informed accordingly. In an adult girl or woman with amenorrhea it is a wise precaution to think *first* of pregnancy—but not to utter this suspicion until fully fortified by positive facts!

Pathologic Amenorrhea.—*Local Causes.* These must needs be looked for in either uterus or ovaries because both these organs are essential to the menstrual process.

1. Malformations. By bimanual examination, if necessary in narcosis, the total absence or the rudimentary development of uterus and ovaries is determined; likewise congenital atrophy or infantilism of the uterus and congenital atrophy of the ovaries.

Atresias of the cervix or vagina, which may be either congenital or, more often, acquired, lead to an *apparent* amenorrhea; in reality, we have here to deal with *concealed menstruation* and recognize the condition from the

history of amenorrhea with intense pain at monthly intervals and the findings of a tumor above the site of the obstruction.

2. On the part of the uterus, destruction of the endometrium, with or without subsequent atrophy of the entire organ, by excessive curettage, particularly in the puerperium or after abortions, cauterization with carbolic acid, zinc chlorid, etc., or prolonged intra-uterine application may lead to amenorrhea. In these cases there are usually more or less marked symptoms of dysmenorrhea; the ovaries function, but the menstrual congestion cannot be relieved.

3. Certain diseases of the ovaries (bilateral solid tumors, chronic parenchymatous inflammation following acute infectious diseases or severe poisoning with phosphorus or arsenic) may cause amenorrhea if the follicles have been completely destroyed.

4. The operative removal of either uterus or ovaries naturally results in amenorrhea. The same effect is produced by radium or X-ray treatment which amounts to a bloodless castration. The amenorrhea in these cases is characterized by more or less severe climacteric symptoms.

5. Women with urinary fistulae very frequently are amenorrheic. The reason is unknown.

General Causes. These are more frequent than local causes and more important from a practical standpoint. If, then, no obvious local cause can be detected on gynecologic examination, the general condition must be investigated.

1. Endocrine disturbances. A very common cause is chlorosis which is now considered a manifestation of hypofunction of the ovaries and disturbed equilibrium of the whole inner secretory system. In infantilism, the onset of menstruation is usually delayed, while the menopause occurs too soon; in the interval the flow is often abnormally scant. More marked degrees are characterized by prolonged periods of amenorrhea. Other endocrine diseases producing amenorrhea are: exophthalmic goiter, in which the amenorrhea is often ushered in by menorrhagia, myxedema, acromegalia, Addison's disease, diabetes, and obesity, the latter a combination of thyroid and ovarian dysfunction.

2. Wasting diseases. Both the acute infectious diseases (typhoid, cholera, scarlet fever, etc.) and certain chronic diseases (tuberculosis, syphilis, nephritis, leukemia) may produce amenorrhea. In tuberculosis, amenorrhea is often the first symptom that compels the patient to consult the physician. In lues, amenorrhea is infinitely more common than is generally known. In negresses, in particular, I have been impressed with the frequency of precocious menopause about the age of thirty; the ovaries in syphilitic patients with amenorrhea are very often extremely small, hard, and sclerotic. Cachexia from cancer in extragenital organs belongs in this group.

3. Chronic intoxications from morphin, opium, mercury, phenacetin must be mentioned. Some authors include alcoholism. Carozzi reported that in Italy women working on printing presses frequently suffer from amenorrhea (lead poisoning).

4. Profuse hemorrhages lead to secondary anemia and further to amenor-

rhea; this is an effort on the part of the organism to save further loss of blood.

5. Protracted lactation may result in lactation atrophy of the uterus and prolonged or permanent amenorrhea. Racial differences, however, exist. In southeastern Europe lactation is unduly prolonged by the peasant population with impunity, and in the Far East, in Siam and Japan, I have seen nursing continued for three and four years without bad effect.

6. Psychoses (dementia precox, manic depression, etc.) are fairly regularly associated with amenorrhea.

Functional Causes.—In certain cases, more or less protracted amenorrhea occurs even though the genital organs and the entire organism appear normal.

1. Psychic factors, such as fright, fear, grief, and sorrow, may produce amenorrhea, as every experienced observer can testify. Intense desire for offspring or equally strong fear of conception may lead to amenorrhea and other presumptive signs of gestation (pseudocyesis, imaginary pregnancy, "grossesse nerveuse" of the French).

2. Suppression of menses, that is, the sudden cessation of an existing menstruation, is occasionally observed as the result of fright or chilling.

3. Occasional and environmental factors. Country girls who have regular menses in winter are irregular or even amenorrheic in summer as the result of hard work (Mayer). Domestics who come to the city from rural districts often lose their menstruation for a few months. Girls in boarding schools or colleges and nurses in training schools frequently become amenorrheic until they have become acclimated to the changed surroundings and intense mental activity.

Treatment.—Though in the majority of cases amenorrhea causes no discomfort and the so-called menstrual molimina (irritability, abdominal pain, backache, headache, soreness in the breasts, intestinal disturbances, etc.) are present only occasionally, the practitioner is often called upon to treat amenorrhea, particularly when the question of sterility is involved.

According to the particular etiology in a given case, the therapy is either local or general, or a combination of both; the functional causes require no treatment.

Atresia of the hymen, vagina, or cervix must be opened by surgical means. An atrophic or infantilistic uterus we would try to rouse to normal growth and function by local stimulation. To this end the introduction of the uterine sound two or three times a week has been recommended. Dilatation and the prolonged application of an intra-uterine stem have given good results to a number of writers. Kelly and Bandler refer to the claims made for the galvanic current. The cathode shaped like a sound is introduced into the uterus while the positive pole, a long dispersing electrode, is placed on the abdomen. Eight or ten treatments of ten minutes' duration are given three times a week; the strength of the current should be twenty to thirty milliamperes.

These methods, with which I have had but little personal experience, purpose local hyperemia and nutrition of the uterus. The same object may

be accompanied by heat in the form of dry heat, sitz baths, or douches, and certain medicines known as emmenagogues. Of the latter, yohimbin, from one to three 5-grain tablets three times a day, has undoubtedly a specific effect upon the genital organs, but the high price somewhat militates against protracted use. The various preparations of ovarian substance may be administered by mouth and hypodermatically for a number of months. I usually inject one ampule of extract of corpus luteum three times a week and prescribe, in addition, one tablet of any of the solid preparations three times a day. Other emmenagogues are: potassium permanganate, 0.65 (gr. 1), in the form of a pill; apiol, 0.25 (gr. 4), in a capsule; aloin, 0.03 (gr. ½), in a pill; and the salicylates, notably salipyrin, 0.5 (gr. 7½), three or four times a day. These last named medicines should be started several days before the flow is expected. Their effect, however, is uncertain.

In some cases, the hyperemia accompanying sexual intercourse remedies the arrested development.

Where there are menstrual molimina, scarifications of the cervix (Chapter XV) sometimes give quick relief. Opitz recommends suction treatment. The cervix is exposed in a wide tubular speculum, the mouth of which is closed by a perforated rubber stopper; the air is now pumped out for five or ten minutes until the patient feels a slight drawing pain in the abdomen.

Of relatively greater value than any local procedures is the general treatment. From a practical standpoint, chlorosis and infantilism claim our first attention. Patients with either of these conditions need fresh air, sunlight and strengthening food. Chlorotic girls should observe a good deal of physical rest; infantilistic individuals, on the other hand, require carefully graded exercises. In both categories overstudy and mental strain should be eliminated, and it is essential to take the girls out of school or to stop fatiguing and confining lessons (piano). Where circumstances permit, such patients should be sent to the country or the seashore. High altitudes or cold sea baths must be avoided. Hot baths (see chapter on hydrotherapy), particularly the Nauheim baths, are beneficial.

Of paramount importance is the use of iron. Which iron preparation is employed is irrelevant, as the formerly assumed difference between organic and inorganic preparations is no longer recognized. Every physician has one or two favorite prescriptions. The main thing is that they be taken long enough. Personally, I make frequent use of Blaud's Pill Compound which contains iron, arsenic, aloë, and strychnin. Another combination is this:

℞ Tct. ferri citro-chlor..... 27.0 (ʒ 7¼)
Liq. pot. arsenit..... 3.0 (m. 45)

S.: Ten drops in a large tumblerful of sweetened water through a tube.

It is important to give iron *after* meals on a full stomach. Where iron is not well tolerated, the intramuscular injections of iron arsenite will be found useful.

Ovarian extracts (see above) should be combined with the iron medication.

In chlorosis the result of the treatment is almost uniformly satisfactory. In infantilism I have likewise seen a number of amazing successes, even cures of sterility. I make this statement with all possible caution because in medicinal therapy it is extremely difficult to distinguish between the "post hoc" and the "propter hoc," and candor compels me to acknowledge an equally large number of failures.

More recently, preparations of the pituitary body have been recommended. Barrett, for instance, uses the anterior lobe of the gland when there is lack of full development of the genital organs. Should this alone produce no result, it may be combined with small doses of thyroid, 0.12 (gr. 2) daily, or with calcium lactate, 1.0 (gr. 15), at bedtime.

Hofstaetter, v. Jaschke, and others inject 1 to 2 c.c. of pituitrin three times a week until the menses reappear; after this has occurred, the injections are given only in the week before the expected menstruation. There is often a loss in weight if the patient has been obese (because the pituitrin seems to act like thyroid extract), a slight enlargement of the mammae, occasionally with colostrum, and a general improvement. Epistaxis occurs at times as a prodromal symptom. Undesirable by-effects, such as ringing in the ears, vertigo, nausea, and vasomotor disturbances, such as alternating pallor and cyanosis of the face, can be avoided by caution. Hofstaetter is rather enthusiastic about his results and claims that conception subsequently took place in several cases. In about two-thirds of his cases of infantilism, menstruation was produced, usually with progressive development of uterus and ovaries and of secondary sex characteristics.

When in infantilism an abnormally early menopause gives rise to the characteristic climacteric symptoms, the bromids, valerian, and other sedatives give temporary relief and the prolonged employment of ovarian extracts a more lasting amelioration.

The treatment of the other endocrine and general causes requires no special discussion. The therapy, in these, is directed against the underlying condition in each case, leaving the symptom of amenorrhea out of consideration. It would, for instance, be a mistake in pulmonary tuberculosis unduly to stimulate the uterus, for the organism cannot spare the loss of blood; the menses will return spontaneously when the condition of the lungs improves.

The very latest therapy of amenorrhea, which I mention more for the sake of completeness, is X-ray treatment. Momm, Flatau, and others point out that strong doses destroy the ovarian function but that weak doses of X-rays irritate and stimulate the ovaries. In Momm's series, less than half the erythema dose brought about success in five out of eight cases.

LEUKORRHEA

The lining of the genital tract, like all mucous membranes of the body, is covered with a small amount of moisture which serves the triple purpose of protecting the delicate surface epithelium from decay due to dryness, of

restraining pathogenic bacteria, and, in the lower half of the genital passage at least, of supplying lubrication. This secretion is, in the main, derived from glands and is colorless. In the vulva it is thin and serous. In the vagina, where there are but few glands, it is largely a sort of transudation and appears as a homogeneous, milky fluid, due to the admixture of desquamated pavement epithelium; if the degree of desquamation is in excess of the available serous fluid, the vaginal secretion is more mealy, flocculent. The greater part of the moisture in the vagina comes from the uterus. The cervical glands produce a clear, tenacious mucus, those of the endometrium a thin, serous fluid. If these are not thoroughly mixed with the desquamated vaginal epithelium, a flaky appearance results. The chemical reactions of these secretions varies in the different parts: in the vulva and the uterus it is alkaline, in the vagina it is acid. The amount of secretion is increased before and after menstruation, in pregnancy, labor, and during sexual excitement; and it is decreased in childhood and after the menopause.

All gross departures from the normal color, consistence, reaction, and amount of genital secretions are classified under the name of leukorrhea. Such abnormal discharges at no time constitute a clinical entity. In other words, *leukorrhea is merely a symptom caused by a wide variety of pathologic conditions,* and no treatment should be instituted until after a search for the underlying cause. "Vague and casual advice to douche regularly is to be deprecated." (Kerr.)

In order to facilitate this search for the etiologic factor in each case, the following classification of the causes of leukorrhea is presented.

1. Local Causes.—(a) Bacteria and other parasites; (b) uterine tumors, displacements and non-infectious inflammations; (c) foreign bodies; (d) chemical and thermic factors; (e) nutritional disturbances; (f) malignancy; (g) miscellaneous.

2. General Causes.—(a) Endocrine disturbances; (b) nervous influences; psychic factors.

Local Causes.—(a) *Bacteria and other parasites.*—Most frequent among the local causes, in fact, most frequent among all causes of leukorrhea, is bacterial infection. While cervix and uterine cavity are, normally, sterile, the vagina always harbors innumerable microbes of all sorts which, however, become acclimated, lose their pathogenic properties, and change into harmless parasites. But there is at all times ample opportunity for new and non-attenuated bacteria to enter, either spontaneously, for instance from the anus, if the vaginal entrance is relaxed or torn and the perineum very low, or introduced from without by unclean fingers in masturbation or digital examination, and so on. The invading microbe is usually the colon bacillus, occasionally a member of the staphylococcus family. If there are abrasions in the vagina, the microbes find a port of entrance and may set up a more or less intense inflammation, as has been described in the chapter on septic infection. In the majority of cases, however, they lead a sort of saprophytic existence, finding in the normal secretion a favorable culture medium to multiply. These are the cases where on examination no abnormality of the vaginal mucosa can be found and only a copious, yellow, and somewhat offensive discharge of

the consistence of pea soup testifies to the presence of bacteria. Kaolin alone, or with equal parts of carbonate or bicarbonate of soda, insufflated by the Nassauer method (Chapter XXIII), or thickly poured into the vagina through a speculum, will quickly cure the condition; or one or two vaginal douches with salt and bicarbonate of soda, one tablespoonful of each in two quarts of warm water, or permanganate of potassium 1:8000 may be prescribed to wash out the intruders, after which the self-cleansing power of the vagina will assert itself.

By far the most important bacterial infection producing leukorrhea is gonorrhea. In order to avoid repetition, the reader is referred to the description of the diagnosis and treatment in Chapter V. It is sufficient to recall the abundant, greenish-yellow, and intensely irritating discharge in the acute and subacute stages and to remember that the purulent discharge in children is almost altogether due to gonorrheal infection.

The practitioner frequently encounters cases of long standing where the characteristic features of the infection have disappeared. The vaginal mucosa appears normal but the posterior fornix contains a fairly large quantity of mucous or mucopurulent discharge and the external os is filled with a thick, opaque, mucous plug. Gonococci cannot be distinguished amidst the numberless bacteria in the smear, and often enough there are no bacteria of any kind present. The diagnosis of gonorrhea in such cases can only be a tentative one. It is made largely from the history and perhaps from other remnants of gonorrheal infections, for instance, in the glands of Bartholin or the tubes.

Another frequent cause of cervical catarrh and subsequent leukorrhea are birth injuries. In many normal deliveries and almost always after instrumental confinement, there remain more or less extensive lateral tears of the external os which, even if healed spontaneously, affect the original configuration of the cervix. The cervical lips are then often everted, and the cervical mucosa, heretofore sterile and protected from the outer world, comes into direct contact with the bacterial contents of the vagina. The result is an irritation and infection of the cervical mucosa which manifests itself in hypersecretion. By spreading the blades of the bivalve speculum, the highly reddened, velvety mucosa of the cervical ectropion can well be made visible.

Yet another source of leukorrhea is to be found in the so-called erosion. An erosion is a deep red area extending from the external os to the anterior or posterior cervical lip or surrounding the external os in an annular fashion. The origin is not the same in all cases. It may be due to a bacterial endocervical catarrh which causes the mucosa to proliferate outward, or it may merely be a physiologic extension of the latter to the outer surface of the cervix; while, ordinarily, the external pavement and internal cylindrical epithelium of the cervix meet at the external os, this juncture may occasionally take place on the outer surface. Instances of this kind may often be found even in virginal persons. In any case, the erosion is covered with a purulent discharge and exhibits, after this has been wiped off, a slightly bleeding surface. The physiologic erosion has, as a rule, a velvety appearance; the inflammatory erosion appears finely granular, often associated with mucous polyps which protrude from the external os.

From the preceding discussion it is evident that the vaginal discharge, whether originally caused by the gonococcus or some other microbe, is in the main produced by the cervical mucosa and it follows that very little can be expected from treatment by vaginal douches. Douches can only remove the discharge mechanically but do not affect the original cause of the discharge. This is true whether vaginal douches are taken four and five times a day or whether astringent, antiseptic, or mucus-dissolvent chemicals are added to the douche water. The local treatment is to attack the inflamed mucosa directly and this may be done by any of the methods which have been discussed in detail in connection with the treatment of chronic gonorrhea in Chapter V. In this connection, the powder treatment of Nassauer is particularly to be recommended. If the cervical canal is to be cauterized, it is important first to remove all secretion from the mucosa so that the caustic agent can penetrate to the surface. The cervix is steadied with a sharp hook (Fig. 87) or volsellum, the cervical mucosa is energetically cleansed with a cotton applicator moistened with a bicarbonate of soda or peroxid of hydrogen solution, and afterwards dried. The caustic (tincture of iodin, silver nitrate, 10 to 20 per cent, formalin, etc.) is then applied.

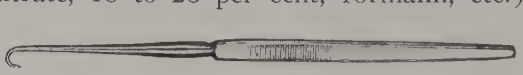


FIG. 87.—THE SHARP HOOK IS OFTEN SUFFICIENT TO STEADY THE CERVIX AND CAUSES LESS TRAUMATISM THAN THE VOLSELLUM.

The treatment should be repeated two or three times at weekly intervals; if unsuccessful it should be discontinued after this time. Personally, I prefer a single treatment with the electrocautery or with silver nitrate in substance; at the most, I repeat the treatment once after the lapse of a month. Glycerin tampons may add to the efficacy of the cauterization. The addition of ichthyol, boric acid, tannic acid, protargol, etc., is very popular, but the hygroscopic action of the glycerin is probably the more important part of this treatment.

In view of the fact that it is impossible to say whether the catarrh of the cervix has not extended into the uterine cavity, many physicians include the latter in their cauterizations. The technic of these intra-uterine treatments is described in a subsequent chapter.

Erosions heal spontaneously, as a rule, after the cervical catarrh has been cured and require no separate treatment. Nabothian follicles, that is, retention cysts of the cervical glands, must be opened by scarification or electrocauterization which will be described more fully later on.

Cervical catarrhs, as a general rule, are rather obstinate, but most of them yield to treatment along the lines indicated. It is a very important point not to neglect the general organism over the local treatment, for it is a fact that the great and continued loss of body fluid weakens many women to a marked degree. The principles of a generally invigorating régime have repeatedly been touched upon. A visit to a watering place may be of decided benefit. Iron and arsenic should be given even where there is no anemia. Constipation, which in itself is a cause of leukorrhea, should be combated.

Finally, there are cases of deep cervical lacerations with very marked eversion where an operative procedure may be desirable. This question, which more properly belongs to operative gynecology, is at present the subject of much discussion. In the follow-up of patients subjected to trachelorrhaphy or amputation of the cervix, the final results have not been as satisfactory as they appeared at first. It is possible that the deep radial incisions with the cautery as advocated by Hunner and Dickinson (see Chapter XV) will do much to restrict plastic operations on the cervix in the treatment of leukorrhea. It is quite certain that curettage, which is still widely practiced, is useless because the cervical mucosa cannot be scraped away.

By way of recapitulation, we may say that inflammatory leukorrhea emanates from the cervix and cannot be cured by vaginal douches.

Only if the vagina itself is the seat of inflammation and the source of discharge is local treatment of the vaginal mucosa indicated. This is particularly the case if the vagina is irritated by the trichomonas. This parasite belongs to the family of flagellates and lives normally in many of the human mucous membranes that have a slightly alkaline secretion. In the vagina it gains ascendancy if the normally acid reaction of the vaginal secretion has become alkaline, perhaps because of the intermediate effect of the micrococcus alkalescens. In such cases, the cervical secretion is clear, but the vagina is filled with an abundant, thin, foamy, yellow discharge which oozes from the introitus and causes intense burning at the vulva. The latter is diffusely irritated and intertrigo is found on the major lips and the genitocrural folds. The mucosa of the vagina and the vaginal portion is red, rough, granular, and bleeds easily.

The diagnosis of this affection is easy. A drop of secretion is put into a drop of normal saline solution on a slide, covered with a cover glass, and examined with oil immersion lens. The parasites are pear-shaped bodies, a little larger than leukocytes and attract attention by the strong motions of their flagellae (Fig. 88).

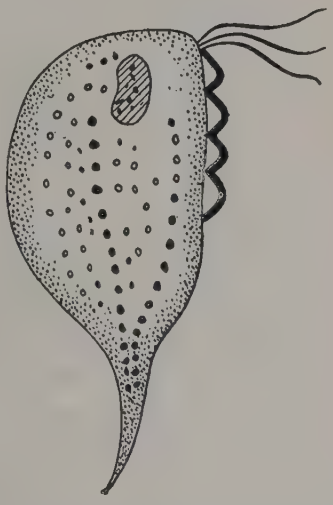


FIG. 88. — TRICHOMONAS VAGINALIS. The organism moves forward rapidly, flagellum-end first (from Eden and Lockyer, *Gynecology*).

Two forms of treatment are in vogue:

1. Through a tubular speculum the vagina is thoroughly rubbed with a 1:1000 bichlorid solution, after which it is filled with 10 per cent borax-glycerin.

2. Douches of a 5 per cent lactic acid solution are given alternatingly with insufflation of kaolin impregnated with an astringent.

This leads us to cases of vaginal discharge where there is no bacterial cause present. In young girls, for instance, there exists at times a real catarrh of the vagina which may be likened to an eczema of the outer skin. While the cervical secretion in these cases is always clear, the vaginal discharge looks like library paste. Douches only makes matters worse because the mucosa does not seem to bear water well.

If treatment is needed at all, equal parts of kaolin and bicarbonate of soda, thoroughly mixed, may be introduced into the vagina. As this vaginal catarrh is often found in anemic girls or those with hypoplastic genitals, a general treatment is more often indicated than local treatment.

(b) *Uterine Tumors, Displacements, Non-infectious Inflammations.*—Fibroids, retrodisplacements, subinvolution, etc., are usually associated with increased discharges from the uterus. The chronic congestion to which the organ is subjected affects also the endometrium and the resulting hyperplasia or hypertrophy of the uterine mucosa manifests itself in hypersecretion. The treatment is causative and is discussed in the respective chapters. The discharge from a sloughing fibroid has an unbearable stench. Retained products of gestation may produce an equally offensive odor. Neither can be distinguished from the foul discharge of carcinoma (see below).

Salus calls attention to a condition frequently observed after the habitual indulgence of coitus interruptus. The uterus is doughy and enlarged; there is vaginal discharge, a sense of bearing down, backache, frequent urination, and increased nervousness. Salus proposes for this symptom-complex the term "marital metritis." Depletion by means of glycerin tampons and scarification is the proper treatment and, of course, discontinuation of the previous sexual practice. "If conception *must* be avoided, the condom is less harmful than withdrawal."

(c) *Foreign Bodies.*—Of foreign bodies, pessaries quite regularly bring about an increase of the natural vaginal secretion by reason of mechanical irritation. This irritation is intensified if the pessary is not cleansed and incrustations produce artificial abrasions. Soft rubber pessaries cause copious discharge in spite of all cleanliness. The precautions to be observed in pessary treatment have been described in Chapter IV.

Cotton tampons left accidentally in the vagina produce an excessively offensive discharge. Other foreign bodies introduced into the vagina and productive of discharge are mentioned in Chapter IV. Foreign bodies inserted in the uterus to prevent conception or cause abortion often produce a cervical catarrh with the results discussed above. The intra-uterine stem, even if introduced antiseptically, does not seem entirely free from this danger, if one may judge from reports in literature.

(d) *Chemical and Thermic Factors.*—Chemically irritating substances introduced into the vagina very naturally produce discharge. I merely mention, more for its curiosity, a case of exfoliative vaginitis following the use of patent medicine suppositories, which I published years ago. These suppositories were advertised to cure leukorrhea, but produced instead a profuse discharge with the expulsion of complete casts of the vaginal mucosa (Fig. 89). Kerwin has since reported two similar observations.

Excessive douching with hot solutions for the relief of discharge often has an effect opposite to that desired. The mucosa first looks and feels as if tanned and later there is an increased leukorrhea. I am aware that the continuous douche recommended on page 161 may have the same undesirable sequela, but it does so much good in other respects that its unpleasant by-

effect may be endured; fortunately, with the discontinuation of the practice the discharge ceases.

(e) *Nutritional Disturbances.*—The discharge of senile vaginitis represents a nutritional disturbance. This, from a practical standpoint, is a very important symptom which does not always receive the attention it deserves. The reader will find a full consideration of etiology and treatment in Chapter VII.

(f) *Malignancy.*—The behavior of the vaginal discharge in cancer of the uterus is highly significant. In Chapter VI the phenomenon has been explained

FIG. 89.—EXFOLIATIVE VAGINITIS (*a*) vaginal entrance; (*b*) external os.

on the basis of the tissue changes. The discharge at first is thin, colorless, and odorless. Very soon there is a tinge of blood which becomes deeper as time goes on. Many women liken it to the water in which meat has been washed. Still later the discharge is altogether bloody and alternates with a dirty brown issue which emits an odor intolerable both to the patient and to others.

(g) *Miscellaneous.*—Of other local causes of discharge, syphilitic and other ulcers, urinary and fecal fistulae, the lochia in the normal and pathological puerperium, and certain very rare causes, such as perforating abscesses, discharging tubes, bursting embryonal cysts, and the like, may merely be mentioned for the sake of completeness.

General Causes.—*Endocrine Disturbances.*—Just as uterine hemorrhages are frequently caused by disturbances of the endocrine glands, more particularly the ovaries and thyroid, so may hypersection be the result of such disturbances. We know, for instance, that chlorosis and diabetes are usually associated with vaginal discharge.

Nervous Influences.—In nervous women, an increase of the vaginal discharge is sometimes observed in times of nervous depression and very obviously so after excitement. Endocrine influences may play a part. "The hormonal stimuli of the ovaries are apparently transmitted in excess to the uterine mucosa; the physiologic premenstrual stage of secretion, as it were, is made permanent." (Matthes.) No local treatment is needed, but pituitrin or other hypophyseal extracts intramuscularly and calcium internally are apt to relieve both the discharge and the concomitant menorrhagias.

Psychic Factors.—Oversensitive women, finally, may have an abnormal perception even of physiologic sensations; in other words, the psyche is at fault. To these the ordinary stream of urine seems hot, and the natural moisture of the vulva impresses itself as "discharge." Yet there are no objective changes, and any local treatment is strictly to be avoided. Psychotherapy and measures for improvement of the general health are the proper procedures.

In conclusion, it may be said once more that the variegated etiology of leukorrhea demands causative treatment in each case. Too much injudicious douching is done or prescribed, and there is very little, if any, use for the curet in the treatment of leukorrhea.

LITERATURE

Amenorrhea

Barrett. In Fairbairn's Obstetrics and Gynaecology, 1921, 493.
Carozzi. Arch. f. Frauenkunde, 1917, 3: 113.
Flatau. Tr. German Gynec. Soc., 1922.
Hofstaetter. Zentralbl. f. Gynäk., 1920, 44: 68.
Mayer. Zentralbl. f. Gynäk., 1917, 41: 569.
Momm. Med. Klin., 1920, 16: 680.
Opitz. In Menge-Opitz: Handb. d. Frauenheilkunde, 1913, 559.
Pinch. In Fairbairn's Obstetrics and Gynaecology, 1921, 879.

Leukorrhea

Curtis. Surg., Gynec. and Obst., 1914, 18: 299.
Gellhorn. Am. Journ. Obst., 1901, 44, No. 3.
Matthes. Wien. klin. Wchnschr., 1919, 32: 849.
Salus. Wien. klin. Wchnschr., 1919, 32: 850.
Schroeder and Loeser. Monatschr. f. Geburtsh. u. Gynäk., 1919, 49: 23.

CHAPTER XI

DISTURBANCES OF FUNCTION AND SYMPTOMS OF DISEASE
(*Continued*)

PAIN

1. **Abdominopelvic Pain.**—In many of the preceding chapters mention has been made of pain as a symptom of various gynecologic diseases and we have already noted certain interesting observations regarding this phenomenon. Thus, comparatively minor ailments may give rise to intense pain, while among the most serious gynecologic diseases there are several which may exist for a long time without causing distress. Again, pain commonly has a pathologico-anatomical basis in the form of a gross alteration of the affected parts; but, on the other hand, there are instances of pain, as, for example, in dysmenorrhea, where no such alteration can be found even by the most careful examination. Further, the degree of pain experienced varies widely in different individuals and even in the same indivdual under different conditions, and as we have no means of accurately measuring pain we must supplement the subjective statements of the patient by other diagnostic data. Finally, the pain itself is not usually sufficiently typical to permit of a definite diagnosis; yet in certain instances it is so well defined and so uniform in character as to be almost pathognomonic.

The subject, then, is of great interest and a discussion of the various kinds and causes of pain in gynecology is profitable because the correct interpretation at once suggests the rational therapy. We may conveniently consider pain in gynecology under two main heads:

A. Pain in association with gross evidence of pelvic disease or abnormality.

B. Pain without physical signs of pelvic disease or abnormality.

PAIN IN ASSOCIATION WITH GROSS EVIDENCE OF PELVIC DISEASE OR ABNORMALITY

Acute Inflammatory Processes in the Pelvic Cavity with Involvement of the Peritoneum.—The commonest cause is an ascending gonorrhea which has extended through the tubes to the pelvic peritoneum. The onset is sudden with a sharp rise in temperature and pulse rate. The abdomen becomes tense and distended; the bowels are locked, no gas escapes, and often vomiting occurs. The pain is very severe and without a let-up. At first it is felt all over the abdomen; gradually one side or the other low down seems to be particularly

painful. Less frequently the reverse mode is observed: a pain first localized in one side, then spreading to the rest of the abdomen. The acute pain slowly subsides to give way to a more dull aching but is very apt to return in its original intensity after a menstruation or any exertion such as lifting, whereby fresh pus may be forced out of the tube into the pelvic cavity. The history of infection, a short time after marriage, for instance, or the account of repeated exacerbations together with the finding, on examination, of a more or less well defined mass in the adnexal region secures the diagnosis.

Puerperal infection produces the same symptoms of peritonitis with intense pain, but the condition is much more serious. The history of a preceding labor or criminal abortion at once puts us on guard. The abdominal distention is enormous, the pulse becomes very rapid, the tongue is dry. Suffering may be excruciating. In fulminant cases which rapidly end fatally, on the other hand, a paradoxical well-being is often seen which to my mind is most ominous; the eyes brilliant from fever, the cheeks flushed, the abdomen moderately distended, death ensues before the patient has experienced much pain.

Acute pelvic cellulitis, likewise following parturition, usually affects the peritoneum when the parametric exudate fills the available space and lifts up the peritoneal covering. The irritation of the latter checks intestinal peristalsis and causes considerable pain. If the exudate does not extend to the peritoneum, there is comparatively little pain; this is more of a throbbing character and radiates down the medial side of the thigh and through to the buttock. The physical signs of parametritis (page 105) impress themselves on examination.

Appendicitis very often causes peritonitic pain which is referred to the abdominopelvic region.

In the diagnosis of peritonitis, Blumberg's sign deserves attention. If the hand pressing upon the abdomen is suddenly lifted, a marked pain felt upon the removal of the hand is highly suggestive of early peritonitis. This sign is all the more useful because in acute inflammations pain as a rule precedes the appearance of inflammatory swellings. It may also be employed in the differentiation from other painful affections in the peritoneal cavity, such as tumors.

The pain of intestinal obstruction, while not strictly belonging to the category discussed, may be mentioned because it is very typical. It is an intermittent colic limited to a certain area of the abdomen which the patient can herself define. It is accompanied by gurglings and rumblings which take a definite course that the patient may trace out with her hand, and these, having reached the limit of this track, "break back" or (she says) return in their track. The pain is very characteristically brought on immediately by the ingestion of anything into the stomach, and the patient fears the next "feed" on this account (Bonney). On the presence of this sign, purgatives are absolutely contra-indicated.

Acute inflammations in the tubes produce pain even if no peritonitis ensues. This is particularly true of gonorrheal salpingitis. The pain is located in one or both iliac fossae, according to the extent of the disease; it is

often described as "sharp shooting," and is almost always worse just before and during menstruation.

That the uterus itself, in the acute stage of inflammation, causes pain is readily understood. The nature of it is an intense ache in the lowermost part of the body. The organ is swollen and the tenderness renders palpation prohibitive.

Subacute and Chronic Inflammations.—In the genital sphere inflammations are likewise associated with pain, particularly if there are adhesions between the pelvic organs and omentum or intestines. The fixation of the omentum often leads to pulling sensations in the region of the stomach. Intestinal adhesions produce a well localized distress which in severe cases may attain ileus-like intensity. Exertions, movements, cohabitation, etc., aggravate the pain. On bimanual examination, the uterine horns are found exquisitely tender; this and the presence of hard, pencil-like tubes are characteristic of an old gonorrheal infection. On pulling the uterus forward towards the symphysis, pain is felt in the sacral and coccygeal regions. That this pain can be greatly alleviated by hot enemas may be mentioned parenthetically.

The endometrium, normally, is free from painful sensations, and, if only the internal os is wide enough, one may introduce a sound into the uterus without the knowledge of the patient. It is well known that in a wide uterus, for instance, in an incomplete abortion, curettage can be performed without any anesthesia. In the inflamed uterus, on the other hand, pain, which is both spontaneous and evoked, is always present. The pain is cramping in character and occurs in the form of attacks; or else the patients complain of a dull ache and bearing down upon the bladder. The patients mostly place this pain in the uterus itself, others feel it more around the umbilicus and even at the costal arch. The cause of the pain is undoubtedly contractions of the inflamed uterine muscle which are aggravated when the increased secretion of the endometrium happens to be held back for some reason or other; that is to say, the freer the drainage, the less pain. The symptoms become regularly worse for some days prior to the menstrual flow; the women "feel their womb," have a constant bearing down, a sense of fullness in the lower abdomen, frequent desire to move the bowels or void urine, complain of indistinct pains in abdomen, back and both legs. Examination with the uterine sound is enormously painful. Sneguireff who made this question the subject of special study and proposed the name endometritis dolorosa for it claimed that slightly roughened irregularities in the uterine mucosa could be detected, the lightest touch of which caused paroxysms of pain. In view of what has been said elsewhere regarding the use of the uterine sound, it is hoped that the practitioner will not consider it his duty to repeat these examinations of Sneguireff.

Intra-abdominal Hemorrhage.—For practical purposes only the rupture of the pregnant tube need be taken into account. Other causes of intraperitoneal hemorrhage are too rare to require consideration.

Extra-uterine pregnancy in its earliest stages causes no pain nor any other symptoms—otherwise many a death could be prevented. Occasionally a patient of this class, though free from pain, consults her physician merely

because she has missed one or two periods and wants to find out whether she is pregnant. In the majority of cases disturbances occur in the second or third month of gestation. Ectopic pregnancy may take one of two courses: tubal abortion or tubal rupture. In the former, which is the more frequent of the two, the egg is loosened from the tubal wall by local hemorrhages which gradually dissect it free; at the same time bleeding occurs into the interior of the ovum. Continued intratubal hemorrhages and contractions of the tubal musculature gradually expel the ovum through the fimbriated extremity into the abdominal cavity. The distention of the tube and the contractions of the musculature impress themselves upon the patient as attacks of cramplike and, at times, very severe pain on the affected side, and each hemorrhage causes a transient feeling of weakness. Small quantities of blood escape into the peritoneal cavity in the earlier stage of the process and cause a peritoneal irritation which contributes to the discomfort of the patients who are already weakened and anemic from the repeated loss of blood. When finally tubal abortion occurs and a large amount of blood fills the culdesac (hematocele), the pain is extremely great. A sensation of intense pressure radiates in all directions; severe backache and bearing down, interference with bowel and bladder action, pressure on the rectum, a reactive distention of the intestines, vomiting, and marked prostration are the symptoms. Quite frequently I have noticed in these cases a pain in the right shoulder, very much like that observed in liver and gall-bladder disease, and I was interested to see that Dewes and Oehlecker have made the same observation.

Unlike the more chronic tubal abortion, tubal rupture represents the most acute catastrophe in the field of gynecology. The patient in the full enjoyment of perfect health is suddenly and without the slightest premonition seized with an abdominal pain of excruciating severity and breaks down unconscious, with the signs of severe, internal hemorrhage: pallid face, cold extremities, thready pulse, rapid distention of the abdomen.

Tumors.—Uncomplicated fibroids and ovarian tumors cause no pain until they have reached considerable size, when they produce discomfort by distention of the abdomen and pressure on other organs. It is otherwise, however, when adhesions form about the growth which, by their dragging, pulling, and tugging, give rise to constant and sometimes very severe pain. The presence of adhesions may be judged from the fact that the surface of the tumor which normally is devoid of sensitiveness is painful to touch on palpation.

As regards fibroids, most of the degenerative processes to which they are liable, give rise to pain. In fact, in a heretofore painless fibroid, the occurrence of pain and rapid increase in size strongly suggest sarcomatous changes. Adenomyomatous growths in the uterus cause severe and prolonged dysmenorrheic pain; this variety is found chiefly in young women. Submucous fibroids in the process of extrusion are the cause of painful contractions of the uterus, particularly at menstruation. Pedunculated fibroids may become impacted in the pelvis and give rise to extreme pressure pain.

In this connection I wish to call attention to *impaction of normal ovaries beneath the pelvic brim.* I have seen this complication in two cases and verified the diagnosis by operation, one in pregnancy, the other in a young unmar-

ried girl. In both instances the pain in the right side where the impaction occurred, was very severe and incapacitated the patient for work. Beyond releasing the normally large ovary from beneath the bony rim, nothing was done. The pain ceased promptly. I have not come across any similar observations in literature.

The symptoms in these cases were quite different from those produced by ovaries prolapsed into the pouch of Douglas where they are irritated by the act of defecation or if touched by the examining finger or in sexual intercourse. The pain is usually that given by a normal ovary when it is pressed or squeezed, a dull, heavy ache, often accompanied by nausea.

In the case of ovarian cysts pain is chiefly produced by rupture or torsion. The commonest types of rupture are those that affect the multilocular pseudomucinous cysts and the papillary cysts. In these cases the giving way of the cyst wall is followed by extravasation of the colloidal contents in the one case and by multiple transplantation of the warty growths in the other. In either, the progress is subacute. The previously painless cyst becomes less distinct, while general abdominal distention is observed with rigidity and tenderness suggestive of a low grade of peritonitis (Berkeley and Bonney). More severe and very characteristic symptoms are produced by the twisting of the pedicle of an ovarian cyst. They consist of intense abdominal pain with signs of peritoneal irritation, radiating pains towards the hips and thighs, obstinate constipation and great tenesmus, increase of pain after eating, occasional diarrheal attacks or seizures of severe intestinal colic.

Significance of sudden and severe pain in right lower quadrant. If a young and heretofore healthy woman is suddenly seized with violent pain in this part of the body, the physician must at once think of (1) acute appendicitis, (2) ruptured ectopic pregnancy, (3) ovarian cyst with twisted pedicle. Only if these can be ruled out, may he consider the possibility of renal colic, torsion of the mesentery, rupture of a pyosalpinx, and other rare complications.

It is very unfortunate—though this may sound paradoxical—that there is no pain in the earlier stages of uterine cancer. How this leads to procrastination on the part of the patients in seeking medical advice has been told elsewhere. Aldrich-Blake observed that the interval between the onset of abnormal symptoms (continuous or irregular bleeding or offensive discharge) and that of pain varied from three to twenty-four months. When pain finally occurs, it is an indication that the disease has involved the tissues and nerve trunks beyond the uterus. The pain is mainly in the back, hips and down one or both thighs and by its constancy and intensity renders the sad lot of these hopeless sufferers doubly deplorable. The appropriate remedies are mentioned in the respective chapters. Glandular metastases remain symptomless for a long time, but as soon as infecting germs have found their way into any malignant deposit in the body, pain ensues. In carcinoma of the outer genitals, pain of various degrees occurs rather promptly, and for this reason we see many such cases at comparatively early stages.

Displacements.—In the chapter on retroflexion it has been pointed out that a certain percentage of patients (estimated at about 12 per cent) have no

pain or discomfort attributable to the displacement. How this phenomenon is to be explained may here be omitted. In the majority of the cases, however, there is backache in the lower lumbar and sacral regions which is more pronounced towards evening after the patient has been on her feet all day, and disappears when lying down; frequently a bearing-down sensation is present and also drawing pain into one or the other leg. The feeling of dragging is hardly ever absent in prolapse, but occurs only in the earlier stages, while, in the final stage, when the uterus is altogether outside the pelvis and the whole

FIG. 90.—HEMATOCOLPOS, HEMATOMETRA AND HEMATOSALPINX IN A WOMAN OF 74. The atresia leading to retention of blood was located immediately behind the vaginal orifice.

vagina is everted, there is no more pain, and the chief complaint is difficulty in walking and in urinating. This strange behavior of the pain in prolapse is likened by Berkeley and Bonney to the case of flatfoot, the earlier stages of which are associated with much pain, but when the arch has entirely disappeared, the deformity, though unsightly, no longer causes distress.

The displacement of all abdominal organs, the enteroptosis, causes a rather typical backache in the upper lumbar region which is to be interpreted as a fatigue pain of the muscles (see below).

Pregnancy.—In threatening miscarriage, the pain has the rhythmical character of labor pain and is felt largely in the back. In cases where conception has followed the operative shortening of the round ligaments, there is almost always a more or less marked tugging sensation in one or both groins which generally subsides after the sixth month, probably because, by then, compensatory hypertrophy of the round ligaments permits of further stretching without undue and painful tension.

Retroflexion of the pregnant uterus more often manifests itself in painful sensations connected with urination rather than in backache or bearing down.

FIG. 91.—ON OPENING THE TUMOR SHOWN IN FIG. 90, THE SOURCE OF THE BLEEDING WAS DISCOVERED IN A CANCER OF THE BODY.

Of the sequelae to parturition, cervical lacerations were formerly considered a source of various pains in the pelvis and back. This view can no longer be supported.

Malformations.—In cases of imperforate hymen or acquired atresia of the vagina, the menstrual flow which cannot escape produces a pain so typical that it should at once suggest the correct diagnosis. At regular intervals of four weeks there are attacks of severe lower abdominal pain which occasionally extends all over the abdomen and causes nausea and even collapse. The absence of external signs of menstruation, the occlusion of the vagina, and the finding, on recto-abdominal palpation, of a large tumor, establish the diagnosis of hematocolpos, hematometra, and hematosalpinx. I have reported a case of this kind in a woman seventy-four years of age, where the vagina

was occluded at the entrance by senile changes and the blood, which eventually produced a tumor larger than a man's fist, was supplied by a carcinoma in the body of the uterus (Figs. 90 and 91). Here the pain was continuous. I also mention for their practical importance three cases of hematometra caused by the complete closure of the cervical canal after radium treatment. In two of these, treated for preclimacteric hemorrhages, the application was followed by one menstrual flow which, being unable to escape, caused intense retention pain. In the third case, that of a cervical carcinoma, a pyometra ensued which quickly extended to the umbilicus and caused considerable pain and fever.

Miscellaneous.—The pain of various affections of the external genitals is too obvious a causation to require comment. Thus, the painful micturition in an acute urethritis, the sensitive swelling of a soft chancre or a Bartholin abscess, or the painful defecation in the presence of anal fissures explain themselves.

PAIN WITHOUT PHYSICAL SIGNS OF PELVIC DISEASE OR ABNORMALITY

We have seen above that some of the most serious gynecologic ailments run part or all of their course without causing pain. On the other hand, we observe numberless girls and women who complain of very intense pain in pelvis and abdomen, yet in whom even the most careful examination fails to find any physical signs capable of explaining the symptoms. At most we may find very minor changes from the normal, such as a cervical catarrh, an erosion, perhaps a cervical tear or a freely movable retroflexion. There is, then, a very noticeable disproportion between the unimportance of our physical findings and the multiplicity and intensity of the complaints which may refer to severe pain in pelvis and back, to bearing down, to burning, cutting or twisting sensations in the abdomen.

There have been several significant changes in the attitude of the profession towards this perplexing problem. The older school accepted whatever could be found on physical examination at its face value, and any minor and unessential deviation from the normal was subjected to treatment or operation in the honest expectation of relieving the multitudinous pains. Then the pendulum began to swing over to the other extreme and, largely under the influence of Charcot and his followers, any woman who did not present an adequate physical abnormality to explain her symptoms was declared to be hysterical and her complaints imaginary. To-day a less extreme attitude prevails. To begin with, we have come to realize that there is a limit to our methods of diagnosis, and that many of the phenomena of pain which we cannot explain, have in reality a very tangible anatomical basis. I refer only to the pain of varicocele, a disease which until comparatively recently had received no attention and which even to-day is difficult to diagnose. The use of the X-ray, particularly in connection with the new method of pneumoperi-

toneum, may be destined to clear up several of our previous diagnostic difficulties.

We find, further, that in most of the cases the women with such a disproportion between complaints and actual findings are not hysterical in the neurologic sense; that is to say, they do not present the typical "stigmata" of hysteria, such as hyperesthetic and anesthetic zones, painful nerve points, changed reflexes, etc. Finally, we are willing to grant that the patients do not altogether "imagine" their complaints and that they act in good faith when they report their pains to us.

We cannot, however, escape the conviction that in cases with normal or nearly normal genitals and also in a good many with well defined ailments, the nervous system is functionally affected. This explains numerous complaints which almost always are associated with the abdominopelvic pain, namely, lassitude, insomnia, anorexia, headaches, neuralgias.

In the light of this newer conception we may say that this functional weariness of the nervous system may produce sensations of pain in the lower abdomen, etc., but also that painful affections in the genital sphere, if they persist long enough, may undermine the nervous stability even in otherwise normal women and that the resulting functional weakness, in its turn, will aggravate the symptoms of the existing genital disease. As so often in medicine, we have here to deal with a real vicious circle. To make my point clear, I shall select a few types from the multitude of complaints without adequate findings.

Take vaginismus as an example. The condition has been discussed elsewhere in this book. In the present connection it is only necessary to point out that the slight traumatism which, in its last analysis, was the origin of the pain, may have long healed but the *fear of pain* remains in the nervous system which had been undermined by the former painful and fruitless attempts at coition. Hence the severe pain that still accompanies any new attempt at intercourse.

Another illustration of the difficulty of our problem is the so-called "Mittelschmerz," a sometimes very acute pain in one or both iliac fossae occurring about halfway between two menstrual periods. The term has been borrowed from the German and means "middle pain." This pain has certainly nothing to do with any pathologic alteration of the genital organs. Aldrich-Blake made a special point in investigating it in her cases of salpingitis: "It was not present in one of them." Neither is it a purely hysterical symptom. It is most probably connected with the maturation of the graafian follicle and the beginning of the menstrual afflux of blood to the pelvic organs, though this mechanism is still conjectural; and the extreme sensitiveness of the ovary at this time may have to be explained as a functional weakness of the nervous system.

How much constipation has to do on the one side with abdominopelvic distress and on the other side with nervousness must be clear to any careful observer.

The appreciation of the rôle of the nervous system in the origin of obscure pain in the genital sphere will prevent the practitioner from making meaning-

less diagnoses such as chronic oöphoritis or subjecting his patients to unnecessary, useless, or even harmful local or operative treatment.

2. **Backache.**—The localization of pain in the back merits a separate consideration. Backache is probably the most common complaint of women. It is frequently the one symptom that drives the patient to a medical consultation. On the other hand, there are many women, chiefly of the working classes, and, again, more particularly from rural districts, who look upon backache as a matter of course and mention it only if specifically asked. To them backache seems as natural and inevitable as the "high stomach" once they have borne children, but *we* know that both conditions, which, by the way, are intimately interrelated, are largely preventable.

Viewed from the standpoint of the practitioner and approximately in the order of their frequency, the causes and locations of backache are:

Sacro-iliac backache.
Lumbar backache.
Backache due to pelvic conditions.
Miscellaneous causes.

Sacro-iliac Backache.—According to Goldthwait who has been the pioneer in this field, the sacro-iliac articulations are true joints with a definite though very limited motion. A very slight but still physiologic increase in motion takes place in pregnancy, probably also during menstruation. Any increase of motion over and above this physiologic minimum enters into the consciousness of the patient in the form of backache, and it has been the lasting merit of Goldthwait to have called attention to the enormous frequency of this condition, particularly in women. His claims, originally published in 1905, have since been fully confirmed by all writers on the subject. Curiously enough, the profession at large ignores this cause very frequently, although it should be the very first to be inquired into if a female patient consults us for backache.

Just as in pregnancy in general the dividing line between the normal and the abnormal is very thin, so may the physiologic relaxation of the sacro-iliac joints easily become pathologic. Some of the backaches complained of during menses for which we can find no tangible or other cause, may likewise be due to a temporary overrelaxation of these joints. Any condition of general weakness, acquired or constitutional, which is associated with a general lack of tone of muscles and ligaments, may eventually lead to sacro-iliac backache. Physical strain or overwork is apt to produce an overrelaxation and even a definite backward subluxation of the upper part of the sacral bone. An injury such as a hard fall or a kick very frequently plays an etiologic part in the history of such patients. Certain faulty postures which are more fully mentioned below in connection with lumbar strain are also of importance. Finally, a definite joint disease, such as osteo-arthritis, abscess, or new growth, may be the exciting cause.

The symptoms vary with the intensity of the sprain. In some cases the backache is most pronounced in the morning after a night's rest. This peculiarity is typical. During the prolonged recumbency, the lumbar spine has become straightened and the back flat. With this, the upper part of the

sacrum, being more movable on account of the relaxation of its articulations, is drawn backward, and when these patients try to leave the bed they find any movement, particularly stooping, almost impossible because of excruciating pain. This, by the way, explains why patients complain of intense backache for days after an operation. In the complete relaxation during anesthesia, the entire spine has been forced to change its physiologic curve into a straight line by the position on the flat and hard operating table. For this reason, pads and cushions placed beneath the body, especially in the lumbar region, should maintain the normal curve of the spine during operation, a self-evident prophylaxis that is only too often forgotten to the detriment of our patients. In the severest cases, standing or walking or any motion in which the trunk or thigh muscles are used is impossible. In milder cases there is only a more or less constant ache, referred definitely to one or both synchrondroses, or more generally across the entire sacral region. There may or may not be distinct tenderness on pressure over the affected joints, and forward bending, if attempted with the knees straight, is limited.

I must forego to enter into more details because this is really an orthopedic subject which should be studied in special works, and I have given this much, quoting largely from Goldthwait, only because of the enormous practical importance of the subject. Because this form of backache occurs unrecognized so very often in women, innumerable patients have unnecessarily been treated or operated upon for this or that gynecologic ailment which in reality had nothing whatever to do with the backache.

As to the treatment of this condition, it would be wisest to refer the patient to an orthopedist in all severe cases. In milder forms the practitioner can well relieve the sufferer immediately by applying a broad strip of adhesive plaster (2 to 3 inches wide) *very tightly* across the sacrum of the standing patient from one trochanter to the other. The alleviation of pain is instantaneous and may be permanent if the sprain has been slight. The plaster should be taken off after three or four days and may be re-applied after a day of rest. After this palliation it would be the business of the specialist to prescribe suitable exercises and an appropriate support to secure a permanent cure.

Very often sacro-iliac and lumbar backaches are associated.

Lumbar Backache.—The area involved is limited by the twelfth ribs above and the crests of the ilia below. The muscles which fill in this interval are the latissimus dorsi with the serratus posticus beneath, the external and internal oblique, the transversalis, the erector spinae mass of muscle, and the quadratus lumborum. In the great majority of instances, pain felt in this region resides in one or more of these muscles. The prototype is the backache of pregnant women in the latter half of gestation. In order not to lose their balance, these women have to bend their spines backwards and produce an exaggerated lordosis. The constant strain on the muscles causes pain from fatigue which, as a rule, disappears very promptly if the muscular effort is relieved by a suitable maternity corset which helps to bear the weight of the abdomen. The same situation prevails if the abdomen is distended by a large

tumor, a fibroid or an ovarian cyst, though the drag on the back muscles is usually not felt so much as in the case of pregnancy.

After childbirth conditions may become even more apt to cause lumbar backache. The recti muscles have been widely separated by the expanding uterus and are likely to remain so and become attenuated, unless the attending obstetrician insists on systematic exercises during and after the puerperium. Figuratively speaking, the door of the abdomen stands ajar, the intraperitoneal viscera sink downward by degrees, and the muscles of the lateral and posterior abdominal walls exhaust themselves in a futile effort to keep the growing enteroptosis within bounds. Such patients complain of a very characteristic pain which starts above the sacrum and extends downward past the iliac crest on either side towards the bladder region. Of course, there are varying degrees of discomfort from a dull, tired ache to a rather acute pain. Rest in bed and lifting up the abdomen with the hand afford relief. If the patient is examined in erect posture and the protruding abdomen, made heavier still by accumulation of fat in the parietes or the omentum, is seen, the need for a support is obvious.

In cases of mild degree an adhesive plaster belt will give prompt though only temporary comfort. More pronounced cases require a suitable corset, while very marked cases of enteroptosis, which are usually associated with adiposity, can be treated only by specially constructed supports. As to corsets, it is not sufficient merely to advise the patient to wear a corset. The physician must specify the kind to be worn, else the fashionable woman will procure one that will hide the deformity but will press the abdomen downward rather than lift it up, and the less well-to-do will buy an inexpensive but utterly useless sort of contrivance. The practitioner in larger cities who does not consider it beneath his dignity to interest himself in details when the welfare of his patient is concerned, will find the managers of special corset shops or department stores only too eager to respond to suggestions and to lay in a stock of sensibly constructed corsets of which there is no lack. In smaller towns the difficulties are greater because the available corsets are quite generally of a notoriously unhygienic pattern, but here, too, the personal initiative of the physician can help matters.

Even the best corset can be only a palliative. A real cure of the backache requires exercises of the abdominal muscles, such as have been described in Chapter XIX. It requires the unflagging interest on the part of the physician to overcome the natural inertia of the patient and insist on regularity, system, and increasing intensity of the movements. It is remarkable how quickly even apparently atrophied muscles respond, so that within two weeks the efficacy of the treatment is convincingly demonstrated and the persistency of the patient kept alive. It is neither necessary nor possible that sagging abdominal walls are altogether changed into firm ones. A very slight amount of muscular tone suffices to relieve the annoying backache.

Inferior to active exercise, yet valuable as a preparatory step, is passive exercise in the form of massage done by skilled hands, and its worth, to which osteopathy owes its vogue, should not be overlooked by the profession. It will be found almost indispensable in women with congenital asthenia or

infantilism, where the weakness of the muscles finds a counterpart in the weakness of will power which militates against energetic active exercise.

Other causes of fatigue pain in the lumbar muscles may be classified as occupational, in those who work or sit too long in faulty positions—a young typist, for illustration, who sits too far forward on the chair, resting her scapulae on the back of the chair, which leaves the lumbar region unsupported and overstretches the muscles, fasciae and ligaments of the spine; or a laundress who works over a low washtub; or a seamstress sitting in a low chair and bending far forward to do fine sewing. To recognize the etiology in these cases means to remove the underlying cause, and, in addition, the thoughtful physician will always take the opportunity to preach the gospel of muscular exercises.

Slight lateral curvatures of the spine are very often the cause of lumbar fatigue pain and in every case the practitioner should make an inspection of the spine in erect posture. He will be surprised to find how often the iliac crests are of uneven height and the legs of uneven length and he will be gratified by the prompt relief that follows if one heel is raised by half an inch.

Another common and quickly remedied cause of lumbar fatigue is faulty footwear such as too high heels placed too far forward under the foot. The profession as a whole does not sufficiently recognize the rôle of the flat foot in the etiology of backache. Still less is its frequent inception in pregnancy and puerperium appreciated. It is a well-known fact, both to physicians and the laity, that after parturition the feet often increase in size and that larger shoes are needed. This spreading of the feet with the corresponding lowering of the arches which is due to the softening and looseness noticeable in all joints of the body during gestation, can be prevented by methodical exercises before and after childbirth, such as walking on the outside edge and on tiptoe with toes turned in, barefooted, at intervals during dressing and undressing. The patient should also be taught while sitting with the knees crossed, to bend the foot (not the leg) slowly upward and downward; then follows a complete rotation in the ankle joint to the right and another to the left. These exercises are gradually increased in number until each is taken fifty or more times. To still further strengthen the plantar structures, the toes are trained to grasp a small solid rubber ball about the size of a ping-pong ball, and this exercise, too, is gradually increased. There is no reason why these exercises should not be taken during the lying-in state. In a fully developed flat foot, the wedging of the heels on the inner side and a suitable shoe will relieve any backache at once, and the exercises just outlined will complete the cure.

For further details regarding lumbar fatigue or static backache, the reader is referred to the writings of Dickinson and Reynolds.

Aside from mechanical causes, a rheumatic affection of the lumbar muscles to which Salin first called attention, may produce the backache. A chloroform liniment will often give relief, or a counterirritant such as the various brands

of analgesic ointments on the market. The results obtained by brushing the affected area lightly six to eight times with the Paquelin cautery heated to a cherry red color are probably due to counterirritation. Static electricity, the application of dry heat, and massage have been used with success. In the treatment by drugs, potassium iodid in small doses is recommended; others prefer salol.

Rheumatic backache, whether acute or chronic, improves with a little exercise. Herein lies the differentiation of backache due to lumbago, where even the slightest motion causes excruciating pain. Lumbago begins without warning, is extremely painful, but lasts only a few days at most. The text-books on internal medicine may be consulted as to treatment. Suffice it here to say that rest in bed, a hot bath, ironing the lumbar muscles with a hot iron, as hot as can be borne through flannel, dry heat and, internally, aspirin or pyramidon are the essentials of a successful treatment. Kelly advises the inauguration of treatment with 10 grains of Dover's powder to produce a free sweat.

Backache Due to Pelvic Disease.—In this group the most frequent etiologic factor is retrodisplacement of the uterus, more particularly retroflexion. The weight of the uterus upon the nerve plexus produces a constant dull ache in the lower part of the back, often radiating into one or the other leg as the retroflexed uterus hardly ever lies exactly in the midline. A small uterus may not exert enough pressure to cause unpleasant sensations, and this is the reason why a good many women with retroflexion do not complain of backache. In the great majority of cases the size of the uterus increases in time (Chapter IV) and with it the degree of pressure and backache. Increased ache about the time of the monthly period is quite obviously due to the premenstrual swelling of the organ. The fact that many women are free from backache only during or directly after the menstruation is readily explained by the depletion of the uterus following a copious flow. Backache from retroflexion is always more pronounced after a day's work when the uterus has been forced down into the culdesac by the abdominal viscera above, and usually disappears with rest. Many women find instinctively that sleeping on the stomach gives them relief; this, by the way, also eases the sacro-iliac backacke.

The pain is hardly ever very severe, but it is constant and nagging, and slowly breaks down the psychic morale, so that even a heretofore strong and healthy woman will develop other signs of general "nervousness," such as lassitude, insomnia, vertical and occipital headache, loss of appetite, neuralgias. This is still more the case in neurasthenic individuals where small causes, if persistent, usually lead to big effects. The proper appraisal of retroflexion as the cause of backache is rather difficult in truly hysterical patients in whom we find painful pressure points in various parts of the body, areas of hyperesthesia of the skin, alternating with those of anesthesia, increased or abolished reflexes, etc. Finally, we may be in doubt as to the women with traumatic retroflexion who complain of backache only until their

damage suits have been settled. I maintain, however, that in the vast majority of cases backache is a very real sequela to retroflexion and that it is a gross injustice to relegate this symptom to the category of more or less imaginary ailments. It would not be necessary to insist so strongly on this point were it not for the present-day tendency to consider an uncomplicated retroflexion as a symptomless condition.

The treatment has been discussed in detail in Chapter IV. In a retroflexion complicated by inflammatory disease of the tubes and ovaries, the resulting backache is considerably increased. Head and Mackenzie, of England, have supplied us with a very plausible explanation. They believe that, aside from the pain felt in the affected organ itself, painful impressions are conducted up the sensory fibers of the sympathetic into the central nervous system and are then "referred" back to the peripheral distribution of the sensory nerves that enter the same segment. Thus, in uterine disease, the region from the tenth dorsal to the 3d lumbar nerve, and, in salpingitis, the 5th lumbar and 1st sacral nerves are involved.

This transmission of pain, according to Mackenzie, explains the backache in labor. Uterine contractions produce backache not because of the pressure of the head on the lumbar plexus, as we were taught to believe, or because of the dilatation of the os, but because of this reflex mechanism; for in abortion and puerperium there is also backache when the uterus contracts.

Menstrual backache with a normal uterus may well be explained by the same theory; the bleeding uterus contracts to overcome any slight obstruction to free drainage.

In the descending or prolapsing uterus the backache is usually described as dragging, and obviously is due to the pull on nerve structures.

Ovarian tumors, as a rule, cause no backache, unless they are incarcerated in the small pelvis or so large as greatly to distend the abdomen (see above). In fibroids, backache is more frequent. Aldrich-Blake encountered it in nearly one third of her cases, and where the fibroid is firmly wedged in beneath the promontory, the backache may completely incapacitate the patient for work.

In cancer of the uterus, backache is always a late symptom and invariably denotes inoperability. Ernst, of Zürich, showed us about twenty years ago by miscroscopic studies that the cancer cells penetrate between the sheath and the nerve, and this explains the excruciating painfulness and intractability of the condition. If this same sort of pain in the back, hips, and down one or both thighs occurs after operation for cancer, it spells recurrence. The only humane course to pursue in such patients is to give opiates unsparingly, perhaps codein with aspirin or pyramidon at first, later morphin by mouth, and finally morphin by hypodermic injection.

Not infrequently is backache caused by affections of the pelvic connective tissue. In some women the sacro-uterine ligaments are found thick, short, and painful, without any signs of inflammation. A careful history will often elicit abnormal sexual practices, particularly interrupted coition; when these are desisted from, the backache quickly ceases.

Chronic inflammatory infiltration of the pelvic cellular tissue behind the uterus, as a result of an old posterior parametritis, may cause very obstinate backache. Prolonged hot douches, sitz baths, diathermy, dry heat, the mercury colpeurynter, in short, all methods which produce an arterial hyperemia, are indicated to soften the contracting tissues and to relieve pressure of the nerves. In women near the menopause, J. Novak injected either 60 c.c. of a ½ per cent novocain solution with suprarenin or 100 c.c. of a normal saline solution into the parametric or paravaginal tissues and claims cure of backache in the few cases thus treated, due to the softening of the cicatricial tissue by an artificial edema. The simple procedure seems worthy of a trial.

Backache Due to Miscellaneous Causes.—Under this heading various causes may be enumerated. In so far as they involve other branches of medicine, the respective textbooks must be consulted. Constipation is a common etiologic factor. Inflammatory conditions of the spinal cord are to be mentioned as well as lesions of the spinal column, such as Pott's disease, spondylitis, osteo-arthritis, and syphilis. On the part of the kidneys, the latent kidney stone, beginning tuberculosis of the kidney and bladder, pyelitis, abnormal mobility may play a part—very rarely nephritis, the popular belief to the contrary notwithstanding. Of abdominal and thoracic conditions, appendicitis, gall-stones, aortic aneurysm, and tuberculosis of the mesenteric glands must be kept in mind, and in a general way all acute or chronic infections and intoxications.

Summing up, backache in women is of extremely common occurrence. In about one third of the cases it is the result of some pelvic disorder; in the great majority, extragenital causes must be held responsible. Among the latter, a strain upon the sacro-iliac joints and ligaments or the lumbar muscles and fascia predominate. A rational treatment presupposes a careful investigation of the etiology in the individual case. Two or more causes may coexist, and this possibility must be taken into consideration in outlining the appropriate therapy.

3. **Coccygodynia.**—The term "coccygodynia" implies a painful affection of the coccyx and the lowermost portion of the sacrum. The disease occurs almost altogether in the female, probably because in men the tubera ischii are closer together and the coccyx is thereby more protected.

Etiologically, coccygodynia is most often due to the traumatism of labor, such as a difficult forceps delivery or the rapid passage of a large, hard head. This may lead to periostitis, subluxation, luxation, fractures, and in some cases to ankylosis. Other etiologic factors are falls, kicks, or repeated severe jolts by which the bone may be broken, the joints stretched, or the inserting muscles torn off. In other cases, a genital affection may be the underlying cause. I saw a young woman who had suffered with the most intense coccygodynia ever since her first confinement fourteen months previously. A surgeon and an orthopedist had been unable to give relief. I found a subinvoluted uterus in extreme retroflexion and cured the patient permanently by simple replacement of the uterus and insertion of a pessary.

Occasionally, a circumscribed edementous swelling is found as the starting

point of painful sensations, presumably a rheumatic condition, but likewise present in caries, necrosis, or neoplasm of the coccyx. If no gross anomaly is found, textbook writers are only too prone to ascribe the condition to marked neurosis, hypochondriasis, or malingering. I deprecate this rather popular tendency of calling neurasthenia what we cannot readily diagnose, and I believe that in such an obscure case the primary cause is an irritation of the fine nerve branches which owes its origin to a long-forgotten traumatism. A preëxisting neurasthenia or hysteria exaggerates the neuralgic pain, but it does not produce it.

In mild degrees of coccygodynia, the pain in the affected part occurs only at certain times, in some patients only during menstruation. In the majority of cases, however, the pain is constant and so severe that even the slightest motion of the coccyx is excruciating. Such patients can neither sit, stand, nor rise from the sitting posture without distress. They have to sit more upon one buttock than upon the other, so that the weight rests on one ischial

FIG. 92.—PALPATION OF THE COCCYX (from Hirst, *Diseases of Women*).

tuberosity and does not reach the coccyx. Defecation and coition are likewise painful.

The diagnosis is made by palpating the coccyx between two fingers (Fig. 92) and locating the seat of tenderness.

As to treatment, most authors favor the surgical removal of the coccyx, an operation which is neither difficult nor dangerous. In suitable cases the results are, indeed, very satisfactory but by no means uniform. Lomer, Rathjen, and others have observed failures from operation, and Brideau and Tissier have seen traumatic coccygodynias heal without surgical intervention. At any rate, the multiple etiology justifies a trial with non-operative procedure. Immobilization and rest are the prime requisites. Protracted hot sitz baths, with the patient on an inflated rubber ring, give much relief and may in the end effect a cure. Gentle massage is highly praised by Findley, Rose, and others. The bone is held between the forefinger in the rectum

and the thumb on the outside; it is then moved backward and forward and the soft parts are moved about on the bone.

Kelly quotes Graefe who cured his cases by faradization in from five to twelve sittings. One pole is applied to the sacrum and one to the coccyx and the surrounding tissues. Seeligmann put one pole into the vagina and so cured a violent case of twelve years' standing with a single treatment.

Chartrier believes that gout causes alterations within the coccygeal canal which produce a constant pain in the second and third vertebra radiating into the spinal column and increased on bending forward, but not affected by touch. He recommends for this pain treatment with radium and the high frequency current.

The bowels should be kept soft and sexual intercourse interdicted. Blisters, counterirritants, and anodyne applications may be used over the site of the bone. Gilliam recommends a liniment composed of equal parts of oil of wintergreen and soap liniment, or the local application of tincture of aconite or unguentum iodi.

By strapping the buttocks together with a broad adhesive plaster, a natural pad may be provided until the above-mentioned procedures have been tried out. Beddard constructed a pelvic support with small rubber rings in which the ischial tuberosities rested.

Aside from all this mechanical and medicinal precedent, attention to the general condition is indispensable. Just because the severe and continued pain is apt to play havoc with an unbalanced nervous constitution, the psychic effect of the earnest attitude on the part of the physician cannot be overestimated.

4. **Dysmenorrhea.**—Painful sensations in the lower abdomen at the time of the menstrual period are called dysmenorrhea. The pain is usually described as colicky; women who have borne children liken it to labor pains. It is located in the depth of the abdomen, radiating to the sides or the thighs; many women feel it mostly in the back. The degree of pain varies within wide limits. Sometimes the intensity is so severe that it completely incapacitates the sufferer, the patients writhing in agony and crying out loud. In other instances, the pain is not intermittent but more or less continuous and assumes a burning, bearing-down character.

Very often the local pain is associated with general disturbances such as nausea, vomiting, constipation or, on the contrary, diarrheas, headaches, various forms of neuralgia, acne and other cutaneous eruptions, frequency and urgency of urination, etc.

The beginning of the pain varies. In some women there is, for several days prior to the period, a constant malaise and bearing-down sensation which steadily grows more intense until relieved by the appearance of the flow. In other cases, the cramps start but a few hours before menstruation and cease when free flow is established. Again, the pain may not begin until after the period has commenced and may continue for hours or days. Some patients will tell us that the first few menstruations had been painless, others that dysmenorrhea suddenly put in appearance following a psychic shock or exposure to cold. Again we hear that marriage and, more often still, the

first confinement put an end to the menstrual suffering. In rare cases, dysmenorrhea may persist after childbirth, or it may not be acquired until afterwards. External circumstances, such as change of residence, climate, occupation, mode of life, exert at times a distinct influence on the occurrence or intenstiy of dysmenorrhea, and there are also cases where once or twice a year menstruation takes place without any pain. The amount of the menstrual flow varies. In the majority of cases the loss of blood is rather small; conversely, we are told of profuse bleeding and the expulsion of blood clots.

A greatly variegated ensemble of complaints, then, such patients present when they consult us; not a disease with a uniform pathologico-anatomical basis, but symptoms which may be due to a great diversity of causes. Let us bear in mind that the word "dysmenorrhea" merely describes the symptoms but is not a diagnosis, and let us try to find the specific etiology in each case so that our therapy may be less of a hit-or-miss variety. This is at times an extremely difficult, if not an impossible, task, but we shall make it somewhat easier if we divide the cases of dysmenorrhea into two large groups: those in which the menstrual pain is associated with, and apparently due to, definite pelvic diseases of one form or another; and those in which the suffering occurs in the entire absence of gross pathological lesions in the pelvis.

To the first category (*symptomatic dysmenorrhea*) belong, for example, the cases of retroflexion and of fibroids of the uterus. In both instances the menstrual flow, as a rule, is large in amount, and if there is any interference with the easy escape of the blood (the acute bend in retroflexion, the tortuous passage in submucous or interstitial fibroids), the contractions of the uterus necessary to expel its contents register themselves as pain. I call attention to these uterine contractions about which I shall have to say more presently. In inflammatory disease of the pelvic organs, the menstrual pain is in reality only an exacerbation of pain which was present throughout the month, but is so much more acute at the time of the period that the patient regards the dysmenorrhea as the important factor.

Here, too, that form of dysmenorrhea of ovarian origin must be mentioned, where the ovary is enlarged to several times its normal size, irregularly bossy in outline, often adherent, and sensitive to touch. The pain, in these cases, is limited to the affected side and radiates into the respective hip and leg; on careful questioning, the menstrual pain is described as merely an aggravation of a more or less steady discomfort in that site. Occasionally, with such a typical ovarian pain there is no corresponding objective finding, that is to say, the ovary is not enlarged, but a lateral deviation of the uterus and the tenderness on examination suggest the presence of adhesions at or around the ovary. In both instances, the pain, in its last analysis, is the expression of increased tension within the thickened tunica albuginea through which the matured graafian follicle has difficulty or is unable to burst. In this way may be explained the cases where this ovarian pain occurs only every other month, the assumption being that in the intervening painless menstruation a follicle had matured in the other, healthy, ovary.

In the classes of cases thus far mentioned, the bimanual examination (in virgins through the rectum) will give us the desired information and, together with the history, suggest the rational treatment—provided, always, that the dysmenorrhea is really due to the gross pathology found and not to any of the causes which will be detailed below.

Only too often the bimanual examination fails entirely. The genital organs appear perfectly normal on palpation; yet the localization of the pain in the middle of the pelvis, the cramplike, rhythmical character, the intense bearing-down sensation extending into the lower back, less often upwards in the direction of the umbilicus or the costal arch—all these symptoms point to the uterus as the seat of the disorder, and if, in addition, it is stated that the pain ceases abruptly as soon as free flow is established, the conclusion must needs be that there is a stenosis of the internal os which does not permit the blood to escape, therefore leads to retention and, by way of reflex, to uterine contractions. The greater the amount of blood or the formation of clots, the more intense is the dysmenorrhea. The logical treatment is dilatation, either slow with sea tangle tents (Chapter XVI), or rapid with metal dilators, the latter in narcosis. To this many gynecologists add the intra-uterine stem treatment (page 305). Curettage is often performed at the same time, but usually is unnecessary, unless the thickened endometrium should be removed because it, too, plugs the internal os. The initial results are, as a rule, good but unfortunately only temporary, recurrences after a few months being rather frequent.

In performing a dilatation, the practitioner is often surprised to find that, instead of the expected stricture at the internal orifice, the sound glides easily into the uterine cavity. There is, then, after all no true stenosis though all the symptoms point to a mechanical obstruction. This leads us to the second large category of cases of dysmenorrhea, those without any gross demonstrable lesions in the pelvic organs (*essential dysmenorrhea*).

In the etiology of this essential dysmenorrhea we can distinguish three factors which occur either alone or in combination: the spasmodic, the congestive, and the endocrine.

The patients with *spasmodic* dysmenorrhea are for the most part young girls or nulliparous women in whom the uterus lies in acute anteflexion, occasionally in marked retroflexion. The pain has the characteristics of obstruction as described above, yet, on introduction of the uterine sound, there is no stenosis nor is there any hypersecretion suggestive of a thickened endometrium. These cases, which are very numerous, form the bulk of those in which dilatation is unsuccessful. It is now generally assumed that the cause of the obstructive pain in such patients is a spasm of the uterine muscle at the internal os and that the interference with free evacuation causes intense contractions of the uterus. We are dealing here with a pathologic intensification of a physiologic phenomenon. I believe that the uterine muscle contracts more or less rhythmically *at all times*. As the uterus changes its position constantly (influence of posture, bladder, rectum, intra-abdominal pressure, etc.), the muscle probably responds with contractions, but these remain normally below the threshold of consciousness just as we are unaware

of the contractions of the heart or intestinal muscles. Only the accentuation of these contractions, for the purpose of overcoming the spastic constriction at the internal os, becomes manifest in the form of pain.

Even in the absence of muscle spasms the uterine contractions are increased during menstruation. This is the reason why perfectly healthy women feel "unwell" at the period, why indefinite drawing, pulling, or dragging sensations occur in the back and abdomen even under normal conditions. The "nervous" woman feels these slight menstrual contractions not as mere annoyances but as distinct pain because her nervous system is below par and reacts violently even to mild stimuli.

Spasmodic dysmenorrhea is very commonly present in patients with hypoplastic uteri and ovaries. It is not easy to say why these patients suffer at menstruation, but it is probably the neurasthenic constitution which is never absent in cases of this kind that produces the hypersensitiveness.

The *congestive* type of dysmenorrhea is more often the result of an inflammation of the pelvic organs and tissues, yet there is a congestion which has nothing to do with inflammation and infection but is due to various other causes, of which a sedentary mode of life, chronic constipation, masturbation, coitus interruptus, and psychosexual excitation may be mentioned. In such cases we fail to find any gross alterations on examination, but we may receive suggestive hints from the history and the character of the pain. The latter may appear a whole week in advance of the menstrual flow; again it may not appear until the first day of the flow or even towards the end of the menstruation. It is hardly ever as excruciating as the pain in spasmodic dysmenorrhea and more of a dull, dragging, bearing-down character, though in markedly neurasthenic women the differences would not be very great.

The third variety of essential dysmenorrhea is the *endocrine*. While the division into spasmodic and congestive types has given us a plausible explanation of the *local*, pelvic symptoms in a very large number of cases, we have not yet touched upon the *general* symptoms of dysmenorrhea. Why does menstruation produce in so many cases nausea and vomiting, headache and neuralgia, diarrheas, swelling of the nasal mucosa or epistasis, salivation, painful enlargement of the breasts, swelling of the thyroid, the liver, or spleen, menstrual psychosis, etc.? Aschner explains these phenomena with the assumption of a sort of ovarian toxemia. If the function of the ovaries is disturbed, if the blood receives a quantitatively or qualitatively abnormal secretion of ovarian hormones, the general symptoms are intensified. The distribution of the effect of these ovarian hormones over the entire body may be assumed to take place by way of the sympathetic nervous system. More than that, the ovaries exert a distinct chemical influence on the uterus. Ordinarily, menstrual blood does not coagulate because the endometrium produces hemolytic ferments. The production of these ferments, again, depends on the ovaries, but, if the function of the latter is disturbed, coagulation ensues and this causes uterine colic. The heretofore obscure origin of the so-called membranous dysmenorrhea in which casts of the uterine lining are expelled with intense cramping pains, can likewise be explained by an insufficient function of the ovaries. It is perhaps the effect of an abnormal

ovarian secretion upon the vagus which causes the spasms of the uterine muscle of which we have spoken above. It is surely a hypofunction of the ovaries which leads to hypoplasia and infantilism and explains also the very scant amount of flow which is so often observed in marked cases of dysmenorrhea. And as the entire organism of the woman is so decisively dependent in every way on the action or function of the ovaries, it is, perhaps, not too much to say that, in its last analysis, dysmenorrhea, like any other normal or abnormal activity of the uterus, is produced by the ovaries.

The reader will find a full discussion of the subject with extensive literature in Aschner's work. Lahm, too, places emphasis on the endocrine factor in the etiology of dysmenorrhea.

Therapy.—In the class of cases with demonstrable pelvic lesions our treatment naturally depends on the nature of the local disease. Where even after the correction or removal of the pelvic cause, the dysmenorrhea persists, it may be that one of the causes of essential dysmenorrhea has been operative, either from the very beginning or superinduced by the suffering due to the pelvic condition. It is, indeed, easy to see that the acute pain which the patient must endure month after month will undermine even a strong nervous system.

As regards the treatment of essential dysmenorrhea, we have at our disposal general and local measures and internal medication. The majority of dysmenorrheic patients present more or less marked signs of weakness of the nervous system, hence are in need of a generally strengthening régime, physical exercises, outdoor sports, hydrotherapeutic measures, etc. In mild cases this alone may relieve the patients. A few years ago, the physician to one of our large girls' colleges in the East reported that by such general hygiene and by eradicating in the girls the idea, fostered, perhaps, by overanxious mothers, of *having* to be sick at periods, the number of dysmenorrheas had dwindled to insignificant proportions. Mosher sees the cause of congestive dysmenorrhea largely in the erect posture, the shallowness of diaphragmatic breathing, an insufficiency of the musculature, and too much rest during menstruation, and urges daily exercises during adolescence to be kept up for many months and even during the menses; only excessive work should be avoided at that time. Particular attention should be given to the bowels. In quite a few instances in my experience, a copious dose of castor oil on the eve of the expected period has prevented the occurrence of pain. Here, too, there is a promising field for nasal therapy (Chapter XX). As we have to deal for the most part with young and virginal individuals, I recommend a trial with this method in all cases before doing anything else. The percentage of successes is not inconsiderable. In the obviously congestive type (see above), the underlying etiologic factors must be eliminated as far as possible. In this connection it may be remembered that Koblanck claims for the nasal therapy a decisively salutary influence in masturbation.

During the attack itself, rest in bed is advisable and most patients take to the bed on their own account. Local measures consist of hot water bags to the lower abdomen and feet and a counterirritant (mustard plaster, oil of wintergreen, etc.) to the back. A hot enema often gives quick relief,

and hot drinks help to make the patient comfortable if the pain is not too severe.

If these measures prove insufficient, internal remedies must be given. Of these, aspirin 0.3 (gr. 5), phenacetin 0.2 (gr. 3), antipyrin 0.2 (gr. 3), pyramidon 0.2 (gr. 3), often combined with one another or with caffein 0.03 (gr. ½) three times a day relieve the neuralgias and headaches and often reduce the pelvic pain. Unfortunately, these drugs lose their efficacy after a while.

In the typically spasmodic type, atropin has given me very good results. Novak describes the mode of employment as follows: "The plan has been to commence the administration of the drug about two days before the menstruation is expected to appear, and to continue its use until the second or third day of menstruation, depending on the usual duration of the pain. Patients differ, of course, in the degree of tolerance to the drug. Ordinarily, about $^1/_{100}$ grain is given three times a day unless some pain appears, in which event, if there are no symptoms of atropin saturation, the doses may be given more frequently. Many patients complain of dryness of the throat, itching of the skin, and sometimes even disturbed accommodation, in which case it may be necessary to lessen the dosage somewhat." It may be given in tablet form and combined, if desired, with some other analgesic, such as aspirin, or else subcutaneously.

Another antispasmodic which has recently come to our attention, is benzyl benzoate. Litzenberg prefers it to atropin because of its non-toxicity. He recommends the following formula:

℞	Benzyl benzoate.....	10.0	(3 $2\frac{1}{2}$)
	Mucilage of acacia.....	5.0	(3 $1\frac{1}{4}$)
	Aromat. elix. of eriodictyon.....	35.0	(3 9)

S.: Give from one half to two teaspoonfuls, according to necessity, every four hours.

The drug is also marketed by various firms under different trade names in gelatin capsules. I have had several very satisfactory experiences with this remedy.

The good effect of all these antipyretics and antispasmodics can be intensified by administering bromids.

Where the dysmenorrhea is associated with menorrhagia, salipyrin 0.3 (gr. 5), fluid extract of hydrastis, 1–2 c.c. (m. 15–30) or stypticin 0.065 (gr. 1) three times a day are often prescribed. Blair Bell reasons that in these cases the tone of the uterine musculature should be increased so that the blood may be expelled into the vagina before it has had time to coagulate. For this reason he prescribes calcium lactate 2.0 (gr. 30) in water every night for one week and then every other night, and in severe menorrhagias also infundibulin tablets 0.12 (gr. 2) twice a day.

In those cases, on the other hand, in which the scantiness of the flow is an outstanding feature of the dysmenorrhea, relief is at times produced by premenstrual bloodletting through a scarification of the cervix. Of in-

ternal medicines which increase the flow and incidentally reduce pain, yohimbin is recommended by several writers. One tablet in tea or coffee is given three times a day for four or five days prior to the expected date.

There is, further, an almost endless list of other drugs and proprietary medicines which have been recommended in dysmenorrhea with which I have had no personal experience. Their very multiplicity suggests their inadequacy, but, on the other hand, points to the great demand on the part of the public.

The most potent drugs in dysmenorrhea are morphin and alcohol. Beyond a very occasional instance where an attack of excessive pain had to be checked instantaneously, I have, for obvious reasons, avoided, as much as possible, the employment of these two drugs. Novak, Opitz, and others speak highly of the quick results of suppositories containing extract of belladonna 0.03 (gr. ½) and extract of opium 0.015 (gr. ¼).

The endocrine influence in the origin of dysmenorrhea seems to me established beyond a doubt, but the therapeutic deductions thus far have been rather meager in results. It is necessary to emphasize this point because the practitioner, misled by commercial claims, is apt to prescribe this or that organotherapeutic product without critical judgment. A number of French authors have reported success in dysmenorrhea obtained with ovarian extract tablets, but these publications carry little conviction with them. Only in arrested development of the genitals the outlook is better, if the patient is not much over twenty. It may then be possible to invigorate the general health by an open-air life and a diet rich in proteins and to further stimulate the growth of uterus and ovaries by iron and arsenic and by certain endocrine products. Of the latter, Blair Bell considers the thyroid most important, others depend on the subcutaneous injection of ovarian extracts. In any case endocrine treatment requires months and years.

In summing up, it would be oversanguine to claim that despite the goodly number of remedies at our disposal we are always able to cope successfully with the suffering at menstruation. If we have tried one thing after another without benefit, we may have to fall back on dilatation, even though theoretically there is no reason to assume that there is any mechanical obstruction at work. Yet the fact remains that many girls who had not been relieved by any previous non-operative treatment lose their dysmenorrheas after marrying and giving birth to a child. As a matter of last resort, when the patients have been driven to despair by their pains and no treatment was found effective, extirpation of the uterus or castration has been performed. For these cases which are, fortunately, few in number, radiotherapy could well take the place of operation. I recall with satisfaction a case of this kind, a woman of forty who all her life had been beset with excruciating dysmenorrhea which had persisted in spite of dilatations, laparotomies, and countless local and medicinal treatments, and who has been able to enjoy her life undisturbed following an intra-uterine application of radium two years ago.

LITERATURE

Abdomino-pelvic Pain

Aldrich-Blake. In Fairbairn's Obstetrics and Gynaecology, 1921, 447.
Berkeley and Bonney. A Guide to Gynaecology, London, 1919.
Blumberg. Berl. klin. Wchnschr., 1910, No. 4.
Brickner. New York Med. Journ., 1902, 76: 544.
Dewes. Zentralbl. f. Gynäk., 1922, 46: 1482.

Backache

Aldrich-Blake. In Fairbairn's Obstetrics and Gynaecology, 1921, 447.
Baisch. In Menge-Opitz: Handb. f. Frauenheilk., 1913, 153.
Dickinson. Am. Journ. Obst., 1911, 63: 1023.
Gellhorn. Med. Rec., August 25, 1917.
Goldthwait. Boston Med. and Surg. Journ., 1905, 152: 593; ibid. 1909, 161: 839.
Mathes. In Nothnagel's Spezielle Pathologie und Therapie, 1913, vii, 2: 386.
McClellan. Regional Anatomy, 1898, 2: 215.
Mennell. In Fairbairn's Obstetrics and Gynaecology, 1921, 905.
Novak. Zentralbl. f. Gynäk., 1920, 45: 417.
Prentiss. Am. Journ. Obst., 1914, 69: 115.
Reynolds. Tr. Am. Gynec. Soc., 1910, 35: 331, and Journ. Am. Med. Assoc., 1910, 56: 1033.
Salin. Monatschr. f. Geburtsh. u. Gynäk., 1895, 2: 301.

Coccygodynia

Anspach. Gynecology, 1921, 552.
Beddard. Brit. Med. Journ., April 13, 1912.
Brindeau. Tr. Soc. d'Obst., Paris, 1911, Abstr. Zentralbl. f. Gynäk., 1912, 36: 207.
Chartrier. Presse Médicale, 1920, No. 21.
Gilliam. Practical Gynecology, 1916, 114.
Kelly. Med. Gynecology, 1908, 245.
Rose. Tr. Obst. Soc., Hamburg, November 6, 1906.

Dysmenorrhea

Aschner. Die Blutdruesenerkrankungen des Weibes, etc., Wiesbaden, 1918. (With extensive literature.)
Berkeley and Bonney. A Guide to Gynaecology, London, 1919.
Blair Bell. In New System of Gynecology, by Eden and Lockyer, London, 1917.
Kroemer. Ztschr. f. ärztl. Fortbildung, 1916, 13: 97.
Lahm. Die pathol.-anatom. Grundlagen d. Frauenkrankheiten, Dresden, 1922.
Litzenberg. Journ. Am. Med. Assoc., 1919, 73: 601.
Mosher. Journ. Am. Med. Assoc., 1914, 62: 1297.
Novak. Menstruation and Its Disorders, D. Appleton & Co., 1921.
Winter. Gynaekologische Diagnostik, 3d ed., Leipzig, 1907.

CHAPTER XII

DISTURBANCES OF FUNCTION AND SYMPTOMS OF DISEASE
(*Continued*)

PRURITUS

The term pruritus[1] signifies itching, and we speak of pruritus vulvae or pruritus ani to indicate the respective location of the disturbance. We are here chiefly concerned with the former. Pruritus vulvae, then, is an affection of the external genitals which varies in intensity from a slight or occasional irritation, manifesting itself in sensations of an itching, tickling, burning, pricking, or creeping character, all the way to an irritation so severe as to be a continual torment, making the day miserable and turning the night into a curse. "In such extreme cases," says Kelly, from whom this graphic description is borrowed, "the sufferer becomes haggard and worn with sleepless nights made hideous by the constant impulse to relieve the horrible itching by tearing at her person. . . . So intense is the suffering in these cases that the patient sometimes loses all self-control and leads an isolated life in order that she may attend uninterruptedly to the imperative demands of the disease, which excite an uncontrollable desire to rub the affected parts. Cases have even been known when, after years of suffering, the patient has committed suicide as the only means of relief from torture."

The expression "disease," just used, is not quite accurate, for pruritus has no well circumscribed pathologico-anatomical basis. In fact, the histological data are very meager and since 1891, when Webster defined pruritus as a subacute inflammation of the papillary bodies of the skin and a slowly progressive fibrosis of the nerves and nerve endings, particularly in the clitoris and the upper portions of the labia minora, our knowledge of the structural changes involved has not materially increased. Whether or not these cutaneous alterations are present at the outbreak of the itching, the furious rubbing and scratching soon leads to multiple abrasions of the skin which may become infected more or less extensively. This constant irritation causes further inflammatory changes consisting, in the main, of an enormous thickening of the horny layer of the epidermis with an extensive round-cell infiltration beneath, and these changes may eventually involve not only the clitoris and labia, but also the perineum, the anal region, and even the genitocrural folds. Then, indeed, a vicious circle is established: the itching provokes scratching, and the scratching, in its turn, causes changes in the skin which excite more itching, and this again provokes the desire for relief by renewed scratching, and so the affliction grows constantly worse, feeding

[1] The word "pruritis" which appears in many medical publications does not exist.

itself upon the very means which the victim instinctively seeks for relief. (Kelly.)

We know now that pruritus is not a disease in itself, but only a symptom of a great variety of widely different affections. The main issue, therefore, is to determine for each case the underlying specific disease and then to institute a causal therapy which, fortunately, is very successful in most cases.

Before that, however, and until this causative treatment has taken effect, the patient must be given some purely symptomatic treatment, for the distress is usually so great as to demand immediate, albeit temporary, relief. A fairly satisfactory procedure, in my experience, is to apply thin and small cotton pledgets soaked in a 5 per cent cocaine solution, to the affected parts for 5 minutes, and then to apply in exactly the same manner a 5 to 10 per cent solution of silver nitrate. The itching area is then kept covered for two days with a bland ointment, such as a boric acid ointment, cold cream, mentholated vaselin, or the like, and the treatment is then repeated, or the phenol mixture of Engman and Mook, of which Crossen speaks very highly, is used for a few days.

℞	Phenol	2.0	(m. 30)
	Liquor, carbon. deterg	3.0	(m. 45)
	Calamini	6.0	(gr. 90)
	Zinc. oxid	6.0	(gr. 90)
	Glycerin	8.0	(ʒ 2)
	Aqu. Rosae q.s. ad.	120.0	(ʒ 4)

In mild cases, thick dusting with stearate of zinc will give temporary relief until the curative treatment has had time to exert its effect.

As to the latter, the ultimate causes of pruritus may be divided into three large groups: (1) local, (2) general, (3) nervous or psychic, and from a didactic viewpoint considered in detail in this order.

For practical purposes we proceed as follows: We first, and in *every case,* examine the catheterized urine for sugar, because *diabetes* is a very frequent source of pruritus, and many a case has been discovered by the gynecologist before there were any other symptoms. If sugar is found, appropriate treatment is, of course, instituted at once, but at the same time one of the above-mentioned remedies is applied and the affected parts are kept scrupulously clean. In the absence of sugar, we look for any *irritating discharges from the vagina,* another prolific source of pruritus. In a general way, any of the factors discussed under the head of leukorrhea in Chapter X may secondarily cause an involvement of the vulva and it is readily understood that a massive, purulent secretion must needs macerate both the mucosa and epidermis of the outer genitals, lead to scratching or rubbing and thus, in the manner described above, to further extension of the affliction. In our investigation we must, therefore, pay particular attention to any signs of gonorrhea in the cervix or urethra, not overlooking the possibility of irritating secretion from inflamed Bartholin's glands. The presence of an erosion and a chronic endocervicitis may also be highly significant. Cervical polyps,

particularly if their surface is no longer intact, necrotic submucous fibroids, or cervical cancers, if present, are almost certainly the cause of pruritus in such cases. The detection of any such condition makes the appropriate treatment self-evident, and the measures employed against the primary cause usually do away with the pruritus without any separate treatment for the latter. A neglected pessary merely has to be removed in order to put an end to any itching about the vulva.

According to my observations, thin, colorless, scanty, and almost invisible discharges cause, on the whole, more intense pruritus than abundant, thick, purulent secretion. This is particularly true of the discharge of *senile vaginitis* which is very acrid and irritating to the vulvar mucosa. As described in Chapter VII an almost specific remedy which hardly ever fails, is pure pyro-

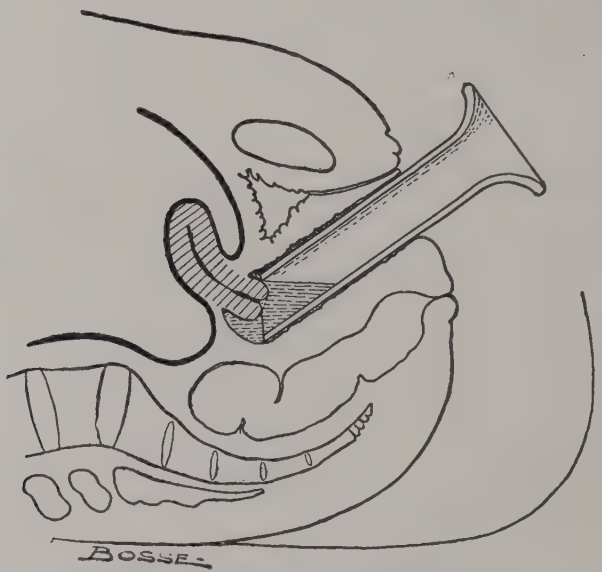


FIG. 93.—HALF SECTION SHOWING THE FERGUSON OR OTHER TUBULAR SPECULUM IN PLACE WITH FLUID POURED INTO IT. By moving the speculum up and down, a large part of the vaginal wall can be bathed (from Bandler, *Mecidal Gynecology*).

ligneous acid, of which one or two tablespoonfuls are poured through a tubular speculum into the vagina (Fig. 93). The patient's hips being raised, the acid is kept in contact with the vaginal mucosa for three minutes by moving the speculum up and down. Then lower the table, let the acid escape, and gently dry the vagina with cotton sponges. Following this, apply a 1 to 5 per cent solution of silver nitrate to the irritated vulvar mucosa and cover the area with any bland ointment. Three or four treatments at intervals of two days completely relieve the patient, but as this so-called senile vaginitis is not really an inflammation, but a physiologic phenomenon of nutritional retrogression, she must be warned that, in a few months or a year, the itching is likely to return.

Occasionally after a panhysterectomy a few *granulations* appear in the vaginal vault. These create a slight discharge with intense itching in the

vulva, but discharge and pruritus disappear as soon as the granulations are scraped off with a sharp spoon and tincture of iodin has been applied.

In pregnant women, a *granular vaginitis* occurs at times giving rise to a copious and highly irritating discharge which easily macerates the succulent mucosa of the vulva. The vaginal walls are highly reddened and the granular surface is readily recognized by touch and sight. Vaginal douches with a ½ per cent lactic acid solution or, better still, a bath of the vagina with a 2 per cent silver nitrate solution through a tubular speculum, give speedy relief.

Yet another form of vaginal discharge is that caused by the *trichomonas vaginalis*. This condition has been discussed fully and the treatment described in Chapter X. It may merely be repeated that the discharge is abundant, foamy, and light yellow in color.

Pruritus may occur only at or after *menstruation,* or an existing pruritus may become aggravated at that time. The explanations given vary between a nerve reflex, a menstrual (ovarian) auto-intoxication, and simply lack of cleanliness and irritation of the drying blood.

Urinary incontinence in vesical fistulae, urethral caruncles and polyps, and the dribbling of urine from ischuria paradoxa (page 53) may be mentioned as occasional causes of vulvar irritation with pruritus.

In not a few cases, particularly those of long standing, there are eczematous changes about the vulva extending over the perineum and the genitocrural folds. In such cases it is difficult to say whether the pruritus caused the eczema or vice versa. At any rate, the skin affection must first be treated. If the surface of the eczema is moist, ointments are not to be recommended. It is better first to dry out the parts by means of a dry heat apparatus or an electric light bulb, a short reading lamp, or the like, placed between the thighs of the patient. The phenol mixture mentioned above or a dusting powder will serve the same purpose. Then follow applications of silver nitrate solutions (5 to 10 per cent) once or twice a week, preceded by a cocaine solution if the local tenderness is too great. When all open places have healed, an astringent ointment is in order, for instance, the following:

Bismut. subnitr.		1.0	(gr. 15)
Zinc. oxid.		2.0	(gr. 30)
Lanolin			
Vasel. alb.	āā	30.0	(ʒ 1)

This ointment is also thickly put on gauze which is placed in intimate contact with the skin, vulva, and anus, and pushed into the vagina. If the use of the ointment was begun too soon, the itching is increased. In such cases, ½ per cent salicylic acid or thymol in alcohol or a hot bichlorid solution may also be used for superficial washing several times a day.

Another excellent preparation is tar.

℞ Ol. rusci.		6.0	(ʒ 1½)
Ol. oliv.	q.s. ad.	60.0	(ʒ 2)

S.: Rub in at night with a stiff brush.

This is particularly beneficial in elderly women where the affection runs a markedly chronic course. In these, the thickened epidermis of the entire vulva is often covered with scabs and flakes, and open lesions can be seen only after the pubic hair has been shaved off.

This eczematous condition can be well differentiated from *kraurosis vulvae* (Chapter VII). The latter affection covers the entire outer genitalia, usually in elderly women, and leads to an atrophy of the vulva with narrowing of the vaginal entrance. The color is dead white and the skin of a characteristic dryness. Sometimes there are no symptoms present; in other cases

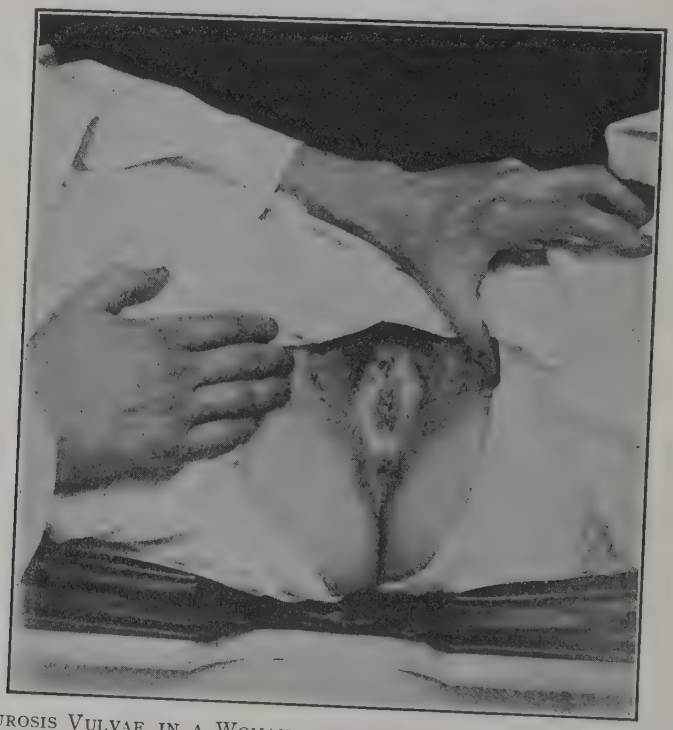


FIG. 94.—KRAUROSIS VULVAE IN A WOMAN OF 30. Note extreme shrinkage of the external genitalia with complete disappearance of the labia majora and minora and the clitoris; also the extensive area of white discoloration and, in the upper part, abrasions and ulcerations caused by scratching.

the itching is well-nigh unbearable and then there may be bleeding fissures and superficial ulcers as the result of scratching. The usual pain-relieving topical applications fail entirely, and the treatment consists of the excision of the affected parts or even all of the outer genitalia. Quite recently, however, I have observed in a woman of sixty, in whom operation was contraindicated for other reasons, a complete cure from the use of X-rays combined with the ultra-violet ray. The white discoloration has given way to a pinkish color, the vulval mucosa is soft and moist, and the itching and burning have disappeared. I also want to put on record a case of kraurosis cured after an extended course with ovarian tablets. This happened in a young woman addicted to morphin with resulting amenorrhea (Fig. 94). Morphinism

(see below) may produce pruritus, and the cure of the habit may have contributed to the happy outcome of the case.

The careful examiner in his search for possible local causes of the pruritus will sometimes find a *pediculosis* in cases which have resisted treatment by other physicians. The crab lice or their nits are firmly attached to the pubic hair and, to the naked eye, look like a yellowish scale or a small crust; they are readily recognized with a magnifying glass. Coal oil or oleate of mercury rubbed well into the hair two or three times at daily intervals will destroy the parasites. Shaving, of course, cures the condition instantaneously. Any remaining irritation of the skin calls for some of the soothing remedies enumerated above.

In other cases, a *thrush* infection may be at the bottom of the distress (Fig. 95). This is due to the invasion of a fungus, the oidium albicans, the same that is found in the mouth of poorly nourished infants. In fact, nursing women may, by lack of cleanliness, infect themselves from their babies. In general, the parasite flourishes only when the local resistance is low, as, for instance, after pregnancy or some long illness. It is particularly often found in diabetic women, as it thrives on a mucosa moistened by the sugary urine. The diagnosis is easy enough where the fungi form large white patches, almost like diphtheritic membranes which are surrounded by a zone of redness, but requires much more care when the colonies are very small and scattered here and there over the inner aspect of the major lips or a protruding vaginal mucosa. The presence of sugar calls for a thorough search for the oidium. These white spots or patches cannot be wiped off with cotton nor can material for microscopic examination be obtained with a platinum loop. It is necessary to scrape a piece off with a dull spoon. The material may be placed on a slide and examined after it has been moistened for a few minutes with liquor potassae. It is composed of long, fine threads (mycelium) and many oval bodies (spores). The threads or fibers branch out freely and are thickly matted together. Specimens do not stain well with methylene blue. A thin carbolic acid-fuchsin solution is preferable. Still better is the Unna-Pappenheim carbolic acid-methylgreen-pyrodin solution, which stains the cellular elements a bluish-violet and the oidium a reddish color. As to treatment, antiseptics (argyrol, 25 per cent), etc., may be poured into the vagina through a speculum. "After the application, dust powdered borax into the vagina and then introduce a tampon wet in 50 per cent boroglycerin. Such treatment, given every day or every other day for several weeks, usually stops the disease. After the fungus has been destroyed, mild

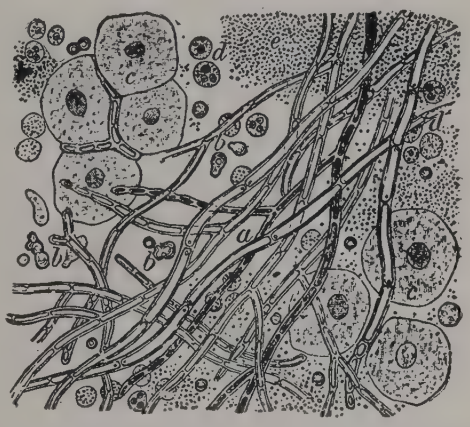


FIG. 95.—THE THRUSH FUNGUS UNDER THE MICROSCOPE (from Crossen, after Holt, *Diseases of Children*).

antiseptic douches are required for a time for the accompanying simple vaginitis." (Crossen.)

Littauer recommends the painting of the patches with a 10 per cent pyoctanin (methylviolet) solution every other day. The white coating disappears after one or two treatments though the fungus can sometimes be found under the microscope for a while longer. Staining of underwear may be prevented by applying dusting powder thickly to the painted surfaces. After the patches have been completely cast off, superficial abrasions remain which at times cause a good deal of burning; for these, sitz baths with some mild astringent (boric acid, bran, etc.) are prescribed, after silver nitrate solution has been applied locally.

In certain cases the itching is rather limited to the region of the clitoris and the upper part of the labia minora. Objectively, merely a thickening of the prepuce is found. The condition is sometimes due to *lack of cleanliness* and the removal of thick, fatty, and malodorous smegma gives prompt relief.

More frequently the symptom is due to *masturbation.* Every physician knows how difficult it is to obtain reliable information, and even when masturbation is admitted it is often impossible to decide whether this was the primary cause or whether the itching furnished the impulse to self-abuse. At any rate, local treatment should be restricted in these cases as much as possible. Hard, well-filtered X-rays should be used instead, and in view of the strong claims made by Koblanck, nasal therapy (Chapter XXI) should be given a trial.

Varicosities of the major lips which, in pregnancy, may attain the size of a fist, are apt to cause pruritus, just as varicose veins in the legs produce itching in the affected region. *Congestion of the pelvic veins* in general, even if not so obvious as in the labia majora, are at times an etiologic factor. Such, at least, must be assumed in cases where a previous pruritus promptly, and without further treatment, disappeared after the removal of a pelvic tumor, the correction of a displaced uterus, particularly in retroflexion in pregnancy, or the operation for prolapse.

At times, pruritus vulvae occurs as an extension of a pruritus ani. Therefore, all *anal conditions* productive of pruritus should be searched for and treated (hemorrhoids, eczema, fissures, fistulae). In a case of this sort which I observed a year or so ago, cauterization with trichloracetic acid of a circumscribed area near the anus succeeded where all previous measures had failed.

In little girls who complain of itching, it is a safe thing to think first of *thread worms,* especially when the distress is particularly marked after going to bed. The worms usually creep out of the anus at night and wander about the vulva and even into the vagina. Often these little patients are unjustly accused of masturbation, though eventually they may acquire the habit if the right treatment is not administered in time. Even if the living parasites cannot be detected, the examination of the feces hardly ever fails to demonstrate eggs, if thread worms are at work.

If it is added that sometimes hard, tense *scars* in the vestibule or perineum, or that *inverted* hairs upon the major lips may give rise to itching, and that

in some cases pruritus seems to precede the first appearance of *vulvar cancer,* the list of local causes of pruritus may be considered fairly complete.

Less exhaustive is the enumeration of therapeutic measures because it is impossible to give a complete list of all the drugs, remedies, and methods which have been tried and recommended. Most analgesics or counterirritants have been used, sometimes with more or less prolonged benefit, sometimes without any success, and this fact emphasizes the necessity of searching conscientiously in each case for the underlying etiology. Where all other means have failed, various operative measures have been proposed, such as excision of the affected parts, thermocauterization, resection of afferent nerves, etc., some of which have been crowned with exceptionally brilliant results. Quite recently, an increasing number of successes with X-ray treatment is being reported, giving promise of a still better outlook in the future.

Whatever local treatment is being given, whether it be merely symptomatic or truly curative, it must needs be supplemented by general treatment. A hygienic mode of life must be insisted upon; exercise in fresh air, a well regulated diet, without any highly seasoned dishes or overstimulating liquids (coffee, tea, alcoholics), a cold bath in the morning and a warm one at night —these are needed to strengthen the body, to increase the tone of the skin, to render the nerves more resistant and the general condition more fit to cope with the situation. Iron and arsenic have their places in this régime, and, in the beginning, it is rather important to make use of bromids, valerian, and mild hypnotics (sulphonal, veronal, etc.) to steady the shaken nervous system and to procure the much-needed sleep.

This general therapy is indicated also in cases where *general causes* are apparently operating, which, by irritation of the cerebral cortex, cause itching, not only about the vulva but over the entire body. Of these general causes, the very great significance of sugar in the urine has already been emphasized. Other factors within this group are chronic nephritis, jaundice, chronic constipation, alcoholism, morphinism, iodoform poisoning, and other chronic intoxications.

If neither a local nor a general cause can be found on careful study of the case, we are forced—for want of a better explanation—to assume the influence of a nervous or psychic factor; and, if none of our measures bring relief, we should refer such patients to a neurologist for psychotherapy.

DISTURBANCES OF MICTURITION

Urinary symptoms are very common in women. They may take the form of an abnormally frequent desire to urinate, of pain before, during, or after micturition, of partial or complete incontinence of the bladder, or, on the contrary, of difficulty in starting urination or retention, etc. The treatment is based upon the recognition of the underlying etiology in each case, and it is, therefore, essential to bear in mind that urinary disturbances may be due either to general or local causes; the latter, again, may arise from the urinary or the genital tract or both.

General Causes.—Increased amount of urine (polyuria), often associated with increased frequency of urination (pollakiuria), is one of the manifestations of diabetes. Disease of the spinal cord produces polyuria which, however, may be covered over by a concomitant retention (ischuria). In cardiorenal disease, various degrees of urinary output, from polyuria to scantiness (oliguria) and even stoppage of urinary secretion (anuria), are observed. All these conditions and their relief belong in the province of internal medicine.

Nervous women quite generally void large quantities of urine at frequent intervals. There is no special discomfort, and the urine, on examination, is chemically normal, though it is very watery and of low specific gravity. It is significant, diagnostically, that these women are not disturbed in their sleep by desire to urinate, and a few doses of bromids will promptly remedy the diurnal polyuria.

Local Causes.—*Urinary tract.*—Frequent and painful micturition may be due to urethritis, urethral caruncle, prolapse of the urethral mucosa, or new growths. In the bladder, these symptoms may be caused by cystitis, trigonitis, tuberculosis, stones, and other foreign bodies, or an irritating condition of the urine. Finally, pyelitis or pyelonephritis may give rise to polyuria and dysuria. The treatment of some of these urinary conditions has been discussed in Chapter VIII.

Genital Tract.—Physiologically, there is in many women increased frequency of micturition during menstruation. Frequent urination is likewise normal in pregnancy—in the second and third months, when the enlarged and sharply anteflexed uterine body weighs heavily upon the fundus of the bladder, and, again, near term, when the child's head presses against the neck of the bladder.

Aside from these physiologic factors, any enlargement of the uterus (subinvolution, fibroids) may mechanically interfere with the normal capacity of the bladder and thus cause frequency of urination. The same is true of any tumefactions outside the uterus, such as ovarian cysts, tubal swellings, hematoceles, and exudates. In all these instances of pollakiuria there is no pain present, unless there is, at the same time, some organic trouble in the bladder or urethra.

The effect of retroflexion on the bladder is usually very marked. The trigon, which is intimately connected with the supravaginal portion of the cervix, is dragged back and put on a stretch when the uterus falls into retroflexion. The venous congestion which follows the displacement (Chapter IV) affects the bladder wall. In addition there is probably also a direct nerve stimulation of the detrusor fibers, caused by the distortion of the trigon. At any rate, such patients have a frequent desire to urinate at night as well as in the daytime, and, as the vesical sphincter is likewise distorted, there is also a pronounced urgency of micturition; the call must be obeyed at once, lest there be an involuntary escape of urine.

Much more serious is the retroflexion of the pregnant uterus. At first there is only increased frequency of urination, as in the non-pregnant displacement. In the third month, however, if the retroflexion has not corrected

itself in the meantime, the growing uterine body becomes incarcerated in the pelvic cavity which it fills completely. The cervix is pushed forward and upward and firmly compresses the urethra and neck of the bladder. The vesical mucosa becomes edematous and the detrusor paralyzed. The result is retention and overdistention of the bladder (Fig. 21). Stoeckel quotes several authors who found quantities ranging from 5 to 10 quarts of urine in such bladders. The nutrition of the bladder wall suffers from the continued pressure of the stagnant urine, and mucosa and musculature become anemic and necrotic, the sphincter muscle becomes insufficient and urine begins to dribble outward. Ammoniacal decomposition takes place in the retained urine and an ascending infection along the course of the sluggish stream of urine produces gangrene of the necrotic bladder wall. This gangrene may remain limited, that is to say, certain portions of the wall drop off and are expelled, or it affects the entire wall with the result of solitary or multiple perforations into the abdominal cavity.

In either event, the life of the patient is at stake. All the more reason to *prevent* an incarceration of the pregnant uterus. Hence, the importance of a bimanual examination at the first appearance of bladder symptoms in pregnancy, and the replacement of the uterus and its fixation in a pessary. The ordinary methods of reduction are, however, not suited because of the danger of abortion; more suitable is the weight treatment with a mercury colpeurynter (Chapter IV).

If the bladder is already found overdistended, replacement of the uterus must be postponed until after the bladder has been emptied. This is done by means of a soft rubber catheter which is inserted straight upward, because the urethra runs in a perpendicular direction immediately behind the symphysis. In doing the catheterization, it is essential to evacuate the urine *slowly* and *intermittently*. If all the urine would be permitted to escape rapidly and at one sitting, the overstretched bladder would be unable to contract at the same pace. The resulting vacuum will lead to catastrophal hemorrhage from bursting blood vessels in the bladder wall. Stoeckel suggests the following procedure: Let out 500 c.c. of urine and inject 250 c.c. of boric acid solution. After a pause of fifteen to thirty minutes, withdraw 700 c.c. of urine and inject 300 c.c. of fluid, and so on, according to the amount of urine in the bladder, but always with pauses between the manipulations. After all the urine has been drained, fill the bladder half full with boric acid solution, let this run out after fifteen minutes, but keep the catheter in place for a day until the bladder has recovered sufficiently to permit of the replacement or evacuation of the uterus. The latter, if necessary, had best be done with instruments to avoid any dangerous pressure through the abdominal walls.

Most frequent among the genital causes of urinary disturbances is relaxation of the vaginal wall subsequent to labor. In cases of cystocele there is often a relative insufficiency of the vesical sphincter. The bladder is displaced downward and the sphincter from its original circular form is drawn out into an elliptical shape. Under ordinary circumstances, the closure of the bladder is sufficient, but coughing, sneezing, laughing, in fact, any sudden exertion which increases the intra-abdominal pressure, proves too much for

the constricting power of the weakened sphincter, and urine escapes involuntarily as a result.

Parenthetically, such a partial incontinence may also be found in nulliparous women who are generally debilitated. I have recently observed such a case in a virgin of 50 in whom a sedentary mode of life had led to a weakened condition of all muscles of her body.

In very marked cases of cystocele, and always in prolapse of the uterus there is difficulty in starting urination, and the patients state that they have to push the prolapsed parts inward before they can void. Pain accompanies these symptoms of cystocele only if there is also a cystitis present, but a mild infection is of rather common occurrence.

FIG. 96.—FEMALE URINAL (Kny-Scheerer).

The treatment should be surgical, and the results are uniformly good. Only in elderly women with complete prolapse where there is a distinct contraindication to operation, a pessary of the Menge or Loehlein type (Chapter IV) should be used. The ordinary pessary is unsatisfactory.

Complete incontinence or the inability to hold water varies greatly in degree. Unless it is caused by a developmental defect, it is due to fistula following labor, operation, accidental injury or ulceration. Stoeckel and Walker give good instructions as to how to detect the seat of the fistula. The treatment is surgical. Where operation is refused or otherwise contraindicated, a urinal (Fig. 96) may be worn to give the sufferer some slight relief. The question of enuresis nocturna is discussed in Chapter VIII.

A word may, finally, be said about the perforation of pelvic exudates into the bladder, fortunately a rather infrequent occurrence. A fresh exudate close to the bladder causes very frequent desire to urinate, a constant sense of pressure, sharp, shooting pain, and often retention of urine. As the suppuration involves the bladder wall, these symptoms become greatly aggravated and the fever, heretofore moderate, increases quickly. The perforation manifests itself by the sudden appearance in the urine of large quantities of pus which at first appears to be tinged with blood. There is a pronounced urgency of urination and escape of pus, followed immediately by great relief. In most cases, the urine becomes almost clear in a few days and the pus passes through the bladder without doing harm. (Stoeckel.)

The treatment should be expectant. Rest in bed, milk and plenty of water, urotropin, and attention to bowels are sufficient. Bladder irrigations are superfluous and at times even dangerous. Hot applications to the abdomen and hot vaginal douches may be tried to hasten the process of natural healing. I have recently observed a remarkably quick and complete cure following intramuscular injections of milk (Chapter XXII).

I have had no personal experience with perforations into the bladder of

ectopic gestations, ovarian cysts, and tubo-ovarian abscesses. From the scanty literature I infer that operation is the only available though not uniformly successful, treatment in these dangerous conditions.

LITERATURE

Pruritus

Crossen. Diseases of Women, 5th ed., 1922.
Kelly. Medical Gynecology, 1908.
Littauer. Zentralbl. f. Gynäk., 1923, 47: 25.
Schlein. Zentralbl. f. Gynäk., 1921, 45: 1607.
Tuttle and Hurford. Diseases of Children, 3d ed., 1917.
Webster. Edinburgh Med. Journ., July, 1891.

Micturition

Bugbee. Journ. Am. Med. Assoc., 1917, 68: 693.
Fairbairn. Obstetrics and Gynaecology, London, 1921, 405.
Stoeckel. In Veits Handb. d. Gynäk., 2d ed., 1907, 2: 415.
Walker. In Eden and Lockyer, New System of Gynecology, London, 1917, 3: 123.

CHAPTER XIII

DISTURBANCES OF FUNCTION AND SYMPTOMS OF DISEASE
(*Continued*)

STERILITY

In one of the volumes of this series of monographs, Child has dealt comprehensively with the subject of sterility. The reader is referred to this treatise for detailed information. While this makes it possible for me to give here only a comparatively brief presentation of this intricate and extensive subject, I cannot omit the chapter altogether—not only for the sake of completeness and because the matter should be viewed more particularly from the angle of non-operative therapy, but also because in these days of declining birth rate the practitioner who keeps himself well posted on the subject of sterility is better equipped to discharge his duties towards the common weal. The many economic, sociologic, and ethical causes that underlie what is popularly called "race suicide" and their redress are clearly outside the province of the physician; but where children are wanted and cannot be had for purely physical reasons, the physician by painstaking study of the conditions may often prove himself, in the best sense of the word, the guardian of the public health. His task, to be sure, is not easy, for the question of the cause and cure of marital barrenness is one of the most difficult problems in gynecologic practice.

Sterility is the inability to conceive, and a marriage is considered sterile if pregnancy has not occurred within three years. Some authors (Hofmeier, Chrobak, Mathews) fix the time at two years, while others (Bumm, Fraenkel) demand a time limit of five years. All these figures, of course, are arbitrary, because in numerous cases impregnation has been observed long after three or five years, but the fact cannot be denied that in the vast majority of instances the first conception takes place within eighteen months after marriage.

Forty years ago, Duncan first estimated that about 10 per cent of all marriages were sterile. This percentage has been accepted by all subsequent writers though it seems probable that it has now been exceeded as a result of the enormous increase of venereal disease in the wake of the recent war, and of the steadily growing use of contraceptive methods.

Nothing is more logical in a childless marriage than to investigate *both* partners as possible factors in the existing infertility, yet among the laity and ever so many physicians it is common practice to place the "blame" immediately upon the woman. It must, therefore, be stated emphatically that all modern observers, with rare unanimity of opinion, agree that *in fully half of the cases the cause of the sterile marriage must be sought in the man.* If, then, a physician is consulted on account of sterility, the automatic re-

action on his part should be—but, unfortunately, is not—first to examine the husband and determine his share in the matter. The various causes of sterility in the male, their diagnosis, and the methods of treatment should be sought in the textbooks of urology. Yet even the gynecologist should bear in mind that congenital or acquired malformations or defects of the genitals may be present; that diabetes, tabes, nephritis, morphinism, etc., may cause male sterility; and that a psychic impotence may exist in neurasthenic individuals. Above all, he should ever be mindful of the destructive effect of gonorrhea upon the generative faculties of the man. Not every case of bilateral epididymitis necessarily leads to sterility but it usually does. Let the practitioner not be deceived by the statement that the man has normal erections and ejaculations—his vas deferens may yet be blocked by the old infection and his ejaculate be free from spermatozoa! The search, therefore, for spermatozoa is of paramount importance in every case and the determination of any existing aspermia, oligospermia, or necrospermia becomes an essential and indispensable premise in the treatment of sterility. This question, which seems so very simple, meets, unfortunately, with several practical difficulties. We know now that neither the examination of sperma obtained by prostatic massage nor the study of the ejaculate in a condom gives entirely reliable information. The problem becomes even more complicated on account of the unwillingness of the average husband to submit to any examination, though he often is only too ready to consent to any, even a major, operation on his wife.

For years it has been my habit to send, unbeknown to her, for the husband of any woman who consulted me for her sterile marriage, and to urge him to see a genito-urinary specialist; but the usual outcome was that he took his wife to another physician who, perhaps, was less exacting. In a way, this proof of a guilty conscience has justified my own attitude, but inasmuch as the woman did not derive much benefit from my cautious conservatism, and also for reasons of greater accuracy, I have more recently made use of the "Huhner test" which can be applied without arousing suspicion in either person.

The technic of the Huhner test is very simple. The patient comes to the office four to eight hours after intercourse. The cervix is exposed in a speculum, any excessive discharge is wiped off, and a sterilized platinum loop is gently inserted into the canal. The secretion adherent to the loop is quickly transferred to a warm slide, which is placed on a warm stage and examined under the microscope with a low-power lens. In normal cases very many and lively spermatozoa are seen.

Huhner reasoned quite logically that it is only the spermatozoa which have wandered upward into the cervix that count, as they are the ones that would eventually reach the ovum. Therefore, if any spermatozoa can be recovered from the cervical canal, that fact at once absolves the husband from any share in the existing sterility. Incidentally it also proves that the vaginal and cervical secretions are not inimical to the spermatozoa.

If, however, no spermatozoa are found within the cervical canal, the following possibilities must be considered: either the husband had none or

only dead spermatozoa (azoöspermia or necrospermia, respectively), or he had live spermatozoa which were killed by the secretions of the vagina. The first alternative may be determined by examining a specimen from the "seminal pool" in the posterior fornix; the latter by testing a condom specimen. Both these tests must be performed within one hour after coition.

Let us now assume that the potency of the husband has been established and that the wife bears the responsibility. In order to give at once a visualization of the manifold causes that may lead to sterility in the female, I have made the following classification.

As a preliminary explanation: A sterility is called "primary" if conception has never occurred, and "secondary" if one or more conceptions have preceded an indefinite period of barrenness.

I. Primary Sterility
  A. General Causes
    1. Congenital
      (*a*) Myxedema
      (*b*) Acromegaly
      (*c*) Other endocrinopathic states
    2. Acquired
      (*a*) Obesity
      (*b*) Chlorosis
      (*c*) Diabetes
      (*d*) Exophthalmic goiter
      (*e*) Chronic nephritis
      (*f*) Syphilis
      (*g*) Tuberculosis
      (*h*) Other infectious diseases
      (*i*) Chronic intoxications (lead, morphin, etc.)
  B. Local Causes
    1. Congenital
      (*a*) Malformations
      (*b*) Infantilism
      (*c*) Tumors
    2. Acquired
      (*a*) Gonorrhea
      (*b*) Tuberculosis
      (*c*) Catarrhal conditions
      (*d*) Displacements
II. Secondary (one child) Sterility
  A. Infections
    1. Puerperal sepsis
    2. Gonorrhea
    3. Subinvolution
  B. Traumatisms
    1. Perineal and cervical lacerations
    2. Urinary fistulae

C. Displacements
D. Atrophy of uterus

III. Functional Disturbances
A. Frigidity
B. Dyspareunia
C. Effluvium seminis

This classification will serve to bring some order in the chaos and stay the hand of the practitioner before attempting to correct the sterility.

The *congenital general* causes of primary sterility are represented by disturbances of the endocrine system. We are entering here a field where an enormous mass of literature has accumulated, where theories abound, but actual knowledge is still pitifully scant. "The nearer," remarks Sturmdorf, "the symptom-complex conforms to a fully developed or readily demonstrable endocrinopathic type, the farther the sterility recedes from therapeutic consideration." Of course, we treat endocrine disturbances now with this and now with that "extract," and occasionally we actually deliver heretofore sterile women with various well-established endocrinopathic states, but whether our treatment has had that result, as the endocrinologic enthusiasts would have us believe, or some other totally unknown factor, who can say? At the present imperfect state of our knowledge, a healthy skepticism seems the wiser course. To quote Sturmdorf once more, "Endocrine treatment in sterility is a treatment in a condition of which we know little, by means of which we know less."

Among the *acquired general* causes of primary sterility, we again encounter a number of disturbances of the endocrine glands, such as obesity, chlorosis, and Graves' disease; diabetes, too, is now considered in this group. I have classified them among the acquired causes, merely because they usually put in appearance after the patient has reached sexual maturity; in reality, most endocrine disturbances are probably congenital. The treatment of sterility from these causes coincides with that of the underlying disease. Why albuminuria has a deterring effect upon conception is unknown.

That syphilis, unfortunately, does not interfere with conception is only too well attested by the endless number of congenital syphilitics who encumber the human race. Inasmuch as pregnancy in syphilitics so very often terminates in miscarriage or stillbirth, the disease, from a practical standpoint, must be considered as one of the causes of sterility.

Tuberculosis occasionally prevents conception, though even in advanced stages of phthisis impregnation has been observed.

Mumps, scarlet fever, and other infectious diseases may destroy the ovarian function. In chronic intoxications, finally, where amenorrhea is frequent, the procreative power may be abolished, but in these as in the other conditions mentioned, sterility need not be absolute, and with causative treatment and sometimes even without it, conception may occur.

Of the *congenital local* causes of primary sterility, total absence of one or more parts of the genital tract need not be discussed. Of greater practical importance is an occluded or rigid hymen which prevents the immission of

the penis. Like others, I have, however, observed several cases where the deposition of the semen outside of the hymen sufficed to bring about impregnation. The cure of the condition simply consists of incision with scissors after infiltration of the hymen with a ½ per cent solution of novocain.

The "pinhole" os of the cervix was considered by the older generations of gynecologists an important, if not the main, cause of sterility, and the operative or non-operative dilatation of the stenosis was often enough fol-

FIG. 97.—CERVIX WITH "PINHOLE" OS (from Pozzi, *Tr. Am. Gyn. Soc.*, 1909, Vol. 34).

lowed by conception to give weight to their valuation. We believe to-day that an os which admits a fine probe is sufficiently large for microscopically small spermatozoa to enter and for that reason would need no attention. The truth of the matter is that, behind such a stenosed external os, the cervical canal is usually distended with cervical and uterine secretion which, being dammed up, becomes inspissated and so thick as to check the progress of spermatozoa or to harm them by abnormal chemical reaction. Such a

cervix has a characteristic appearance (Fig. 97). It is long and conical. The tip is attenuated and sometimes so edematous that the punctiform opening can hardly be seen. If, however, the larger upper part of the cervix be squeezed between the blades of the bivalve speculum, an unexpectedly large quantity of discharge will escape. To drain this secretion and keep the canal open for a time is the object of our treatment, and as a stenosis of the external os is usually associated with one of the internal os, the following procedure may be recommended to the practitioner.

A sterilized thin laminaria (sea tangle) tent (Chapter XVI) is introduced into the uterus with the usual aseptic precautions. After twenty-four hours, the canal is wide enough to admit two tents of slightly larger caliber, and on the third day one or two thick tents are readily slipped in.

After the removal of this third set of tents and after repeating the disinfection of the canal with a 5 per cent picric acid solution which precedes and follows each treatment, an intra-uterine stem of glass, silver, or aluminum is inserted and left in place until after the next menstruation. Thereby a dilatation of both the external and internal orifice is accomplished which lasts for several months and may secure favorable conditions for conception to occur.

The technic of the stem treatment, its special indications, and its dangers are discussed on page 305. A few years ago, Nassauer, of Munich, designed a new form of intra-uterine stem called "Fructulet," with which he claimed particularly good results (Fig. 98).

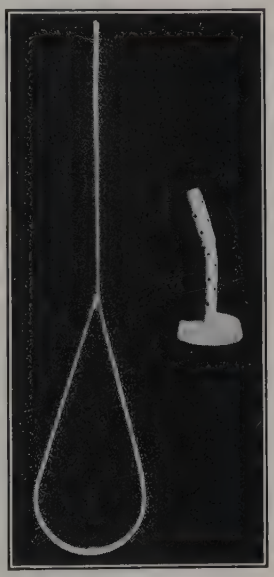


FIG. 98.—NASSAUER'S FRUCTULET, AN INTRA-UTERINE STEM OF ALUMINUM, THE VAGINAL END OF WHICH IS BICONCAVE. The upper concavity lies against the cervix, the lower concavity forms a receptacle for the semen. It is pushed into the uterus by means of the probe, also shown in the picture.

Whatever objections may be raised against intra-uterine treatment in general, and intra-uterine stems in particular, the procedure appeals to me more than the discission of the external os which was so popular a method in the early days of our specialty and which was more recently brought forth again by Pozzi. This operation, which is entirely within the province of the practitioner, simply consists of enlarging the external os by two lateral incisions and then sewing them up in the opposite direction from which they were made. Pozzi's pictures illustrate the various steps without further comment (Figs. 99–102). There can be no doubt that the removal of the mucous plug following this method sometimes facilitates conception, but the operation has not been generally accepted. It is by no means so easy as it may appear to gauge the desirable size of the discission, and Dickinson and Smith very justly remark that the resultant deformity in no wise differs from the ordinary bilateral laceration following delivery wherein the cervical lips may become everted, raw, granular, and sometimes cystic. Moreover, it seems illogical to cut the cervix open in some cases and to sew

it up in others (that is, cervical tears) for the relief of one and the same condition.

This critical attitude is still further strengthened by the realization that the "pinhole os" is after all but an expression of a genital infantilism and is almost regularly associated with one or more of the other manifestations of partial infantilism, such as an unduly long cervix, a disproportionately

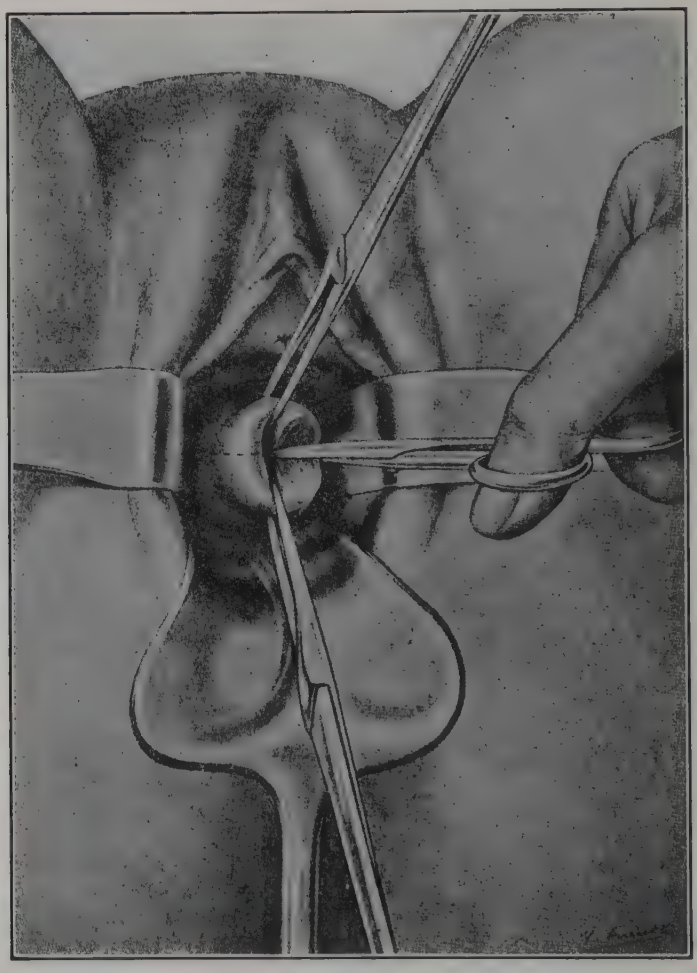


FIG. 99.—POZZI'S STOMATOPLASTY OF THE "PINHOLE" OS CERVIX IN DYSMENORRHEA AND STERILITY. Bilateral incision of the cervix. (This and the following three illustrations are from Pozzi, *Tr. Am. Gyn. Soc.*, 1909, Vol. 34.)

small corpus which lies either in acute anteflexion or retroflexion, scanty and infrequent menstruation, underdeveloped ovaries, abnormal length and torsion of the tubes, short and funnel-shaped vagina, low perineum, etc. The practitioner who pays attention to these signs will find them in more or less marked intensity in a very large percentage of his patients, and in fact, it is this enormous, and heretofore unsuspected, frequency of infantilism which is regarded by many writers as the foremost cause in primary sterility of a

congenital nature. In order to avoid repetition, the reader is referred to the discussion of infantilism in Chapter III.

Only the milder forms, where there is no complete cessation of menstruation, may respond to treatment, provided it is instituted at a fairly early age. After the twenty-fifth year it will hardly ever be possible to restore the ovarian activity to normal conditions. Cervical stenosis, whether at the external or

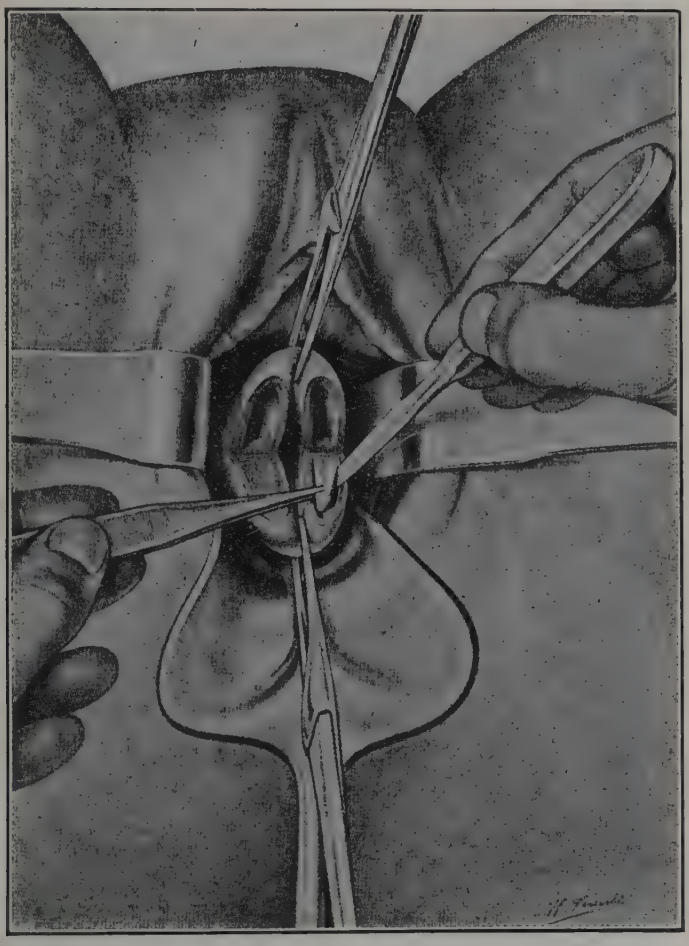


Fig. 100.—Hollowing Out of the Cut Surfaces of the Cervix.

internal os, must be considered as a very mild degree of infantilism and suited to treatment, if the rest of the genitalia is fairly normal. It is in just these cases that the intra-uterine treatment as outlined above is valuable, for it not only dilates the *entire* canal but exerts a stimulating effect upon the growth of the uterus. No local therapy, however, is complete without attention to the general treatment which also has been discussed in detail in Chapter III. May it be merely repeated that healthful outdoor life, iron with arsenic, ovarian extract, and yohimbin are the fundamentals of this general therapy.

Tumors form the connecting link between the congenital and acquired local causes of primary sterility. We may omit tumors of the vulva or vagina which render intercourse physically impossible; the necessity of their surgical removal is obvious.

As to uterine tumors, a definite relation between fibroids and sterility has long been recognized. Fibroids do not render conception impossible,

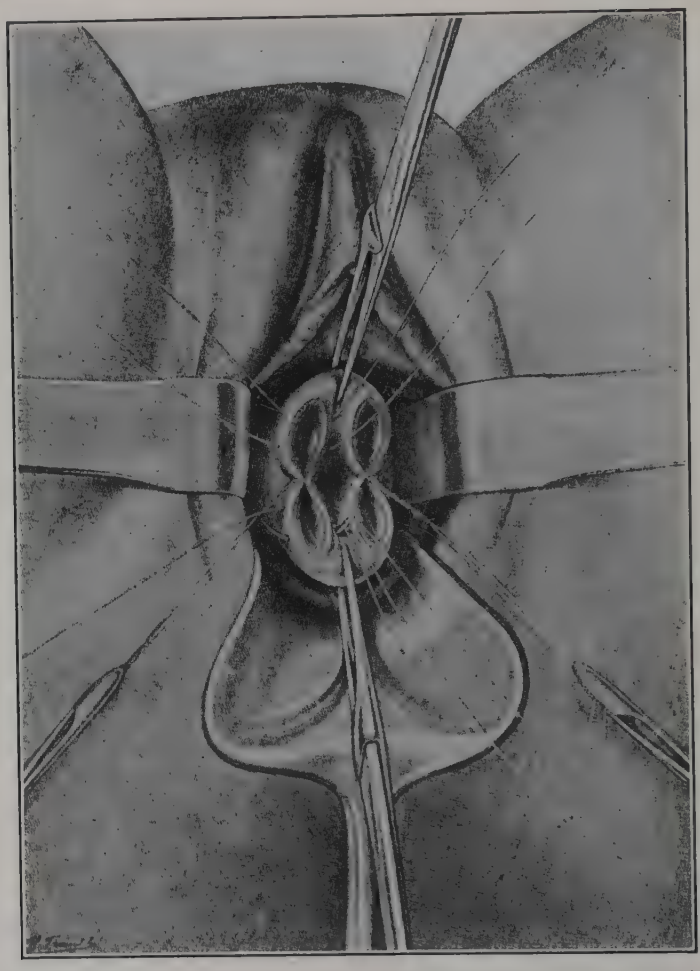


FIG. 101.—INTRODUCTION OF THE STITCHES. (The commissural stitches are drawn tight.)

except in the cases of submucous polyps, but they make it more difficult because the tortuosity of the uterine canal and, perhaps, a disturbed chemism of the endometrium place too many obstacles in the way of the spermatozoa. In sterile women in the thirties with fibroids, the enucleation of the tumors is, therefore, the proper method of treatment if children are desired, and, personally, I have every reason to be satisfied with my results from this conservative surgical treatment.

Cancer of the cervix does not necessarily inhibit conception. Fortunately instances of pregnancy are rare.

Neither do ovarian tumors in themselves render women sterile. Most of us have attended cases of childbirth complicated by ovarian tumors. On the other hand, even a unilateral ovarian tumor may be responsible for an existing sterility, as evidenced by the fact that the removal of a small dermoid or any other kind of ovarian cyst was in many cases promptly followed by conception in theretofore sterile women.

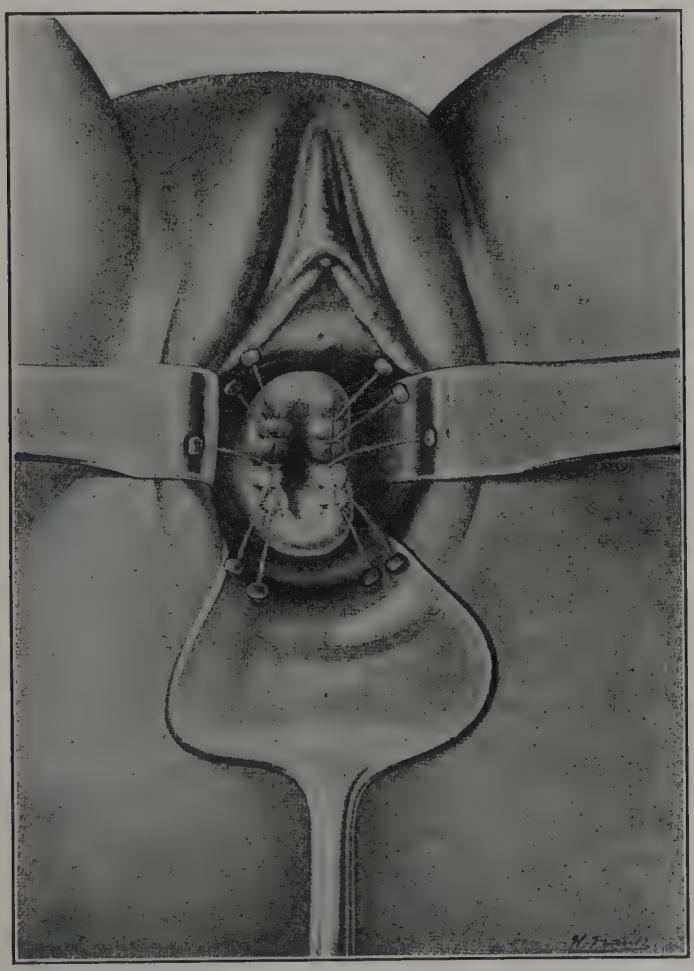


FIG. 102.—THE OPERATION FINISHED. All the stitches have been drawn tight and the leaden guards applied.

Passing now to the *acquired* local causes, it may be said that all authorities agree that gonorrhea has a most deleterious influence upon the fertility of women. I purposely omit percentages because in the entire problem of sterility statistics are particularly unreliable. In the chapter on gonorrhea, the baneful effect upon conception has been dealt with specifically; the various measures of treatment have likewise been presented. In view of this, the brief statement may suffice in this place to have us bear in mind that gonorrhea is foremost among the acquired causes of primary sterility.

A reference to the chapter on genital tuberculosis permits me here merely to mention this infection in connection with sterility. However, I can not refrain from reporting a personal experiece where, after the extirpation of the right adnexa which only by microscopic examination were found to be tuberculous, the longed-for conception took place within a few months.

The subject of catarrhal conditions opens up the wide field of chemical factors as a cause of sterility.

Of the physiologic properties of the spermatozoa, it may only be pointed out that alkaline salts increase their motility, while most acids exert an antagonistic effect. The spermatozoa, after having been deposited in the vagina, come in contact with two different kinds of secretion, that of the vagina itself, and that from the cervix. The vaginal secretion is acid in reaction and destroys the motility of the spermatozoa. This explains to a certain extent why nature provides an enormous number of spermatozoa—225,000,000 on an average—in each ejaculation, although but a single one is actually destined to reach the ovum. We must assume that by such an overproduction of spermatozoa the many obstacles which are present even under normal conditions may be overcome and the ultimate object of sexual intercourse accomplished. The sperma is a concentrated fluid, while the vaginal secretion, at least in normal individuals, is present only in small quantities, and although millions of spermatozoa may be destroyed or paralyzed, there are still other millions which are not affected, and once they reach the cervix, they find there an alkaline secretion which serves as an excellent culture medium and intensifies their motility.

The secretion of the cervical glands forms the well-known mucous plug of Kristeller within which the spermatozoa wander upward into the cervical canal and thence into the uterine cavity. The secretion of the uterine glands is also alkaline and, therefore, favorable to the persistence of the spermatozoa. This has been proved conclusively by a number of observations. Thus Birch-Hirschfeld found, in a prostitute suffocated during intercourse, living spermatozoa in the uterine cavity sixteen hours after the death of the woman. In bats, conception is observed after the semen has been kept in the uterine cavity of the female during the entire winter.

The inhibition due to the normal acid vaginal secretion must needs be intensified if the acidity of this secretion is increased. Mild bacterial conditions of vagina or cervix which produce a strong acidity are, therefore, responsible for failure to conceive. Certain sexual practices, such as prevention of conception, seem to lead in the same direction. Strangely enough, pathologic secretions with alkaline reaction are as harmful as acid ones, and a profuse purulent discharge from any part of the genital tract almost certainly precludes impregnation. There seems to be an optimum of alkalinity beyond which the spermatozoa are either killed or weakened.

It is easy enough to test the alkalinity or acidity of the genital secretions with litmus paper, but I feel that this is too crude a method to determine the fine biochemical processes which take place in fecundation and I wish to warn against too hasty conclusions. A personal observation is a case in point. A woman whose first child I had delivered about three years previously,

consulted me because of her inability to conceive anew. Examination revealed perfectly normal genitalia, and only the vaginal secretion seemed to be more than usually acid. I, therefore, advised douches of sodium bicarbonate solution, but before the patient commenced this treatment, her menstruation failed to appear—she had become pregnant in spite of the strong vaginal acidity.

Let us admit to ourselves that in the therapy of disturbed chemism we are treading on conjectural ground. Our treatment is largely experimental. A trial with various vaginal douches—to weaken hyperacidity, to neutralize hyperalkalinity—is justifiable, but it remains a trial only. I have had the good fortune of curing a few cases of sterility by a course of ichthyol-glycerin tampons, and I feel that the success was due to restoring chemical reactions to their normal conditions though I am unable to explain the exact mode of such restitution. Or would it be safer to say that conception occurred *after,* not just *because* of, this treatment?

A chronic endocervicitis calls for topical applications (Chapter XV). Hunner claims good results in sterility from the use of the thermocautery.

In catarrhal conditions with changes in chemical reaction, local treatment cannot be entirely omitted, but attention to the general health and strength of the patient is probably of equal if not of greater importance.

We are on somewhat safer ground when we consider uterine displacements in their relation to sterility. I firmly believe that retroflexion or retroversion can prevent conception, first, because the cervix no longer dips into the pool of seminal fluid in the posterior fornix but points forward and upward; and second, because the circulatory changes in the displaced uterus produce unfavorable conditions in the mucosa or their secretions. At any rate, the beneficial effect of the replacement of the uterus has been established beyond doubt in untold numbers of cases. I am speaking here of uncomplicated and movable retroflexions. Where the retroflexion is congenital and a manifestation of infantilism, I would be more cautious as to the good that may come from a replacement; in fact, in these cases I would advise against any local treatment or operation. In an otherwise normal woman, however, I feel that every retroflexion should be corrected, by pessary, preferably, along the lines laid down in Chapter IV, or by laparotomy. The latter would enable us to see and remove very fine adhesions which may distort the tubes or occlude their ostia, and which even the most skillful examiner would be unable to detect by bimanual examination. Lest there be any misunderstanding, retroflexion is not an *absolute* bar to conception. A great many women conceive in this condition and carry their pregnancies to full term. Others have one miscarriage after another and thus for practical purposes are sterile.

We speak of *secondary* or *"one-child sterility"* if a woman after three or more years after the birth of her first child has been unable to conceive again. The causes of this relative sterility must obviously be due to something that happened during the first pregnancy, labor, or puerperium, and, as a matter of fact, the determination of the specific cause in a given case is not nearly as difficult as in cases of primary sterility. A good many of

these harmful occurrences might have been avoided, and in a general way it may be said that all that makes for good obstetrics will prevent sequelae which among other effects may be productive of secondary sterility. This pertains preëminently to the various forms of puerperal sepsis which may destroy the normal functions of the genital tract to a more or less marked degree, to subinvolution, to traumatizations of all kinds, and to displacements. The physician who observes the golden rules of obstetrics will see few, if any, cases of secondary sterility growing out of his own practice, but he will probably encounter a good many others as the result of less painstaking work. How to treat such cases according to the individual underlying cause has been told, in part, elsewhere in this book; in part, it may be studied in works on obstetrics.

A few words must be devoted to two prolific sources of one-child sterility which even the most careful practitioner may not always be able to forestall.

We have already spoken of the dire effects of gonorrhea upon fertility. Gonorrhea does not always cause *primary* sterility. The fearful frequency of blenorrhea neonatorum and the drastic measures for its prevention which have been exacted by law are eloquent proofs of the common coincidence of conception and gonorrhea. Once established in the cervix of a pregnant woman, the gonococci form a most serious danger, not only to her future health, but to her future ability to conceive. The practitioner finds himself face to face with a problem that calls for his best efforts to prevent the further spread of the disease, that demands the firm will to conquer, that requires wise judgment and minute attention to details.

During pregnancy, the germ-laden discharge from the vagina must be rendered harmless and the succulent vaginal epithelium protected against infection. This may be accomplished by antiseptic douches (of which I think little), by the Nassauer powder treatment (see page 349), or, perhaps best of all, by the use of a 2 per cent silver nitrate salve which I suggested for the treatment of vulvovaginitis a few years ago. (The technic has been described in detail in Chapter V.) The focus in the cervical canal must likewise be attacked, though the chances of a miscarriage demand utmost caution.

In labor, no vaginal examination should be made and operative deliveries, manual or instrumental, undertaken only for vital indications. After confinement, finally, the uterus should be kept firmly contracted by means of ergot; ice-bags on the abdomen, prolonged rest in bed, and close attention to the bowels further constitute our régime during the puerperium. Yet, with all these precautions, the gonococci are only too apt to ascend the well-prepared pathway into higher parts of the genital tract, and thus gonorrhea is probably the most frequent of all causes of one-child sterility. The treatment—I wish I could say cure—of this phase coincides with that of ascending gonorrhea in general and has been viewed in Chapter V.

Another frequent and equally recalcitrant cause of secondary sterility is infantilism and congenital asthenia. The picture of these constitutional anomalies has been sketched in Chapter III. Childlessness need not always be the fate of such patients if the degree of their anomaly is slight. They do conceive not infrequently and carry to term, though their labors are invariably

complicated, owing either to pelvic and other anomalies of the passage or to insufficient force of uterine contractions. But having achieved a child, their organism seems to have reached the limit of its productivity. These are the women who seem to be unable during the remainder of their lives to recover from the effort and the effect of a single labor. Lactation atrophy of the uterus in these patients is apt to become permanent and, even without nursing, the uterus is liable to remain atrophied. The depression of the entire body may include the ovaries, and permanent amenorrhea may be the final outcome. Such patients need especially careful nursing in the puerperium as well as afterwards, and require a particularly thorough application of the therapeutic régime, propounded in former chapters, to prevent, if possible, the establishment of a one-child sterility.

Among the laity, the belief prevails that *frigidity* is a common source of sterility. In its sweeping generalization this popular assumption is undoubtedly incorrect. To begin with, sexual anesthesia in women is much more frequent than is generally appreciated; Guttzeit estimates 40 per cent! Furthermore, it has been shown by several statistics that the percentage of sterility in frigid women is not higher than in sexually normal women. Again, there are numberless instances of pregnancy in women with outspoken anaphrodisia. I know, for instance, a woman, the mother of four children, who confessed that she had never experienced sexual pleasure. Finally, the cases of gestation following rape, coition in narcosis, or artificial impregnation prove that conception may occur entirely independently of sexual enjoyment.

Frigidity is composed of two distinctly different components: one is the absence of sexual desire (libido), the other the lack of orgasm (voluptas). The former may be an expression of infantilism and may signify an underdevelopment of the ovaries; as such, it is, of course, capable of producing sterility unless the treatment of infantilism happens to be successful. On the other hand, it may have nothing to do with infantilism but be the result of some shocking sexual experience in childhood or adolescence, the fault of a brutal husband, the antipathy engendered by physical or mental incompatibility, etc. Such women may obtain a divorce after years of sterile marriage, and both partners, after re-marrying, have children.

Lack of voluptas is certainly much more common than absence of libido, and while a normal orgasm probably facilitates conception, its retardation is not a bar to it. Moreover, lack of orgasm is frequently amenable to treatment. This question requires tactful investigation into the intimacies of marital relations. Very often, the precocious ejaculation, a sexual neurasthenia, or some other physical anomaly of the husband is the cause and demands rectification wherever feasible. Overfatigue, mental or physical, on the part of the woman may be at the bottom of it, or some perverted sexual practice. The therapy will vary according to the conditions in each case. In a general way, a strengthening régime of the whole organism often changes matters. Of drugs, iron and arsenic, ovarian extract, and particularly yohimbin, alone or in combination, have sometimes given me very satisfactory results. How much suggestion had to do with it, I must leave undecided. A similar form of treatment is advocated by Schlesinger who warns against

any local therapy, if there is no anatomical basis, and assumes a dysfunction of the ovaries as the cause of sterility and frigidity. He employs "thelygan," a combination of extracts of ovary, hypophysis, thyroid, and adrenals, a "shotgun" prescription according to our taste, and adds yohimbin to it. The "thelygan" stimulates the ovaries; the yohimbin produces an arterial hyperemia of the genitals, and this in turn acts upon the ovaries.

From the mere indifference of lacking libido and the partial sexual anesthesia of absent voluptas, we must distinguish the positive aversion against the sexual act, or *dyspareunia.* The latter anomaly may arise from a psychial or physical basis.

Paradoxical though it may seem, masturbation and psychical dyspareunia go hand in hand. We cannot enter here into a detailed discussion of masturbation in the female. Its importance is probably overestimated, and only an excessive self-indulgence is likely to do harm. It would even then be difficult to prove that masturbation ever produces an *organic* disease. Rather is its harmful effect exerted upon the psyche and by a pathological sexual gratification blunts or destroys the normal reaction towards the other sex. In this way a sexual hyperesthesia leads ultimately to sexual anesthesia. These are the aggravated cases that are not cured by normal marital relations. If masturbation is continued after marriage, intercourse may be tolerated without any sexual response, or, on the other hand, abhorred—at any rate, the percentage of sterile women is *relatively high* in this category.

The physician will have great difficulties in getting a clear insight into the situation, and, in any case, treatment is not very promising unless we can rely on Koblanck's claim of the efficacy of nasal therapy.

Another form of psychical dyspareunia is caused by homosexual perversion, or by a pathologic fear of pregnancy or infection which one may find in neuropathic individuals.

Physical dyspareunia, in its last analysis, is due to pain. As a general proposition, pain extinguishes sexual desire or sexual pleasure. In newly married women the vaginal entrance may become hyperesthetic because of clumsy or weak attempts on the part of the husband which do not succeed in rupturing the hymen. The vulvar mucosa is made sore, but as there is no immission of the penis, there is no gratification. A number of other factors (false modesty, abnormal closeness of the vulva to the symphysis, inexperience of the husband, etc.), may contribute. At any rate, every new attempt increases tenderness and fear in the wife.

In many cases of this kind the slightest touch of the external genitals gives rise to reflex cramps of the muscles of the pelvic floor and those around the vaginal entrance. We call this condition vaginismus. There is an intense and involuntary contraction of the vaginal entrance which makes coition impossible and—this is the connection with our subject—leads to sterility. The more nervous or psychopathic the woman, the more intense the reflex contraction and the more unfavorable the prognosis. The very thought of cohabitation or the mere approach of the husband calls forth the reflex. One meets with this condition not infrequently in the examining room.

The simple hyperesthesia of the entrance yields readily to appropriate

treatment. The irritated mucosa of the vulva is treated with 1 or 2 per cent silver nitrate solution and covered with an indifferent ointment. In some cases the rigid hymen may have to be incised under gas or local anesthesia. The husband, too, may have to be instructed.

Marked cases of vaginismus require, first of all, psychotherapy to relieve the excessive fear of the patients. Further attempts at coition are interdicted. The vaginal entrance is dilated methodically. After cocainization of the mucosa, uterine dilators, beginning with the smallest sizes, are introduced. At each treatment larger sizes are inserted and, incidentally, the hymen is torn. Finally, the patient herself may introduce the thickest dilators after the painlessness of the manipulation has been demonstrated to her. Others use bivalve specula which are spread apart after insertion. Electricity has been applied in various forms locally. The principle is to gain the confidence of the patient and then to educate her as to the harmlessness of the procedure.

In more severe cases, surgical intervention, leading to a permanent widening of the vaginal entrance, is preferable. The undermined nervous system must be quieted and strengthened by bromids, cool baths, visits to the mountains or the sea, etc.

As said before, the success in vaginismus is not very encouraging, though, occasionally, coition may become possible and result in conception; but the condition may recur in labor and even after confinement.

In women who have borne children, dyspareunia may result from painful affections about the vulva (ulcers, urethral caruncles, cicatricial strictures, etc.) or in the pelvic cavity (prolapsed ovaries, retroflexion, infiltration of the sacro-uterine ligaments, scars in the vaginal vault after instrumental deliveries, etc.). By interfering with cohabitation, these affections may lead to secondary sterility. The therapy depends on the condition in the individual case and is usually quite successful.

Comparatively seldom is sterility due to *effluvium seminis:* the semen is not retained in the vagina. This may be due to a torn or relaxed perineum, or to an abnormally shallow or funnel-shaped fornix, one of the stigmata of infantilism, or else to an involuntary reflex contraction of the pelvic floor muscles in hysterical or otherwise neuropathic individuals. While not an absolute obstacle to conception, yet the chances of impregnation are reduced by this precocious escape of the semen. Unless the perineum is restored by surgical methods or the excessive reflex action of the pelvic muscles calmed down by bromids, etc., our advice will be to the effect of raising the buttocks upon a pillow during and after cohabitation and keeping the legs together so as to prevent the loss of the spermatic fluid.

Only rarely is the cause of sterility in a given case so obvious, as, for instance, in atresia of the vagina, that the diagnosis can be made at once and appropriate treatment be instituted without delay. In the vast majority, however, an exhaustive history and a very thorough examination are necessary. It is usually the woman who comes by herself to consult us on account of her sterile marriage; and in our questioning we have to bear in mind the manifold etiology which we have discussed in the foregoing. The subject is very delicate and demands a great deal of tact. It is decidedly unwise

to investigate at once into the intimacies of marital relations; such details had better be postponed until the physician has gained the full confidence of his patient. One must be equally cautious in inquiring about masturbation. The answer is usually in the negative. The more vehement and indignant the denial, the greater the probability of the habit.

The examination has to take into consideration all the points raised above in connection with the problem; but whether or not a tangible cause is found, *no opinion should be given and no treatment administered until the potency of the husband has been fully established.*

The treatment of the various causes of sterility in the female has been indicated in the foregoing pages or else must be looked up in works on operative gynecology.

There are, however, a good many cases left in which no tangible cause can be found. In such instances, artificial impregnation, or to use a better term, artificial insemination, may be tried. This procedure, by which semen is deposited directly into the uterine cavity, requires several essential premises: the semen must be absolutely healthy; there must be no sign or suspicion of old or recent infection in the female genital sphere, and, finally, the tubes must be patent. The patency of the tubes is tested by Rubin's ingenious method of insufflation with oxygen. The reader will find the details of the technic in Rubin's monograph, a companion book of the present volume. Only if these three premises have been satisfactorily established, is insemination permissible. More recently, nitrous oxide has repeatedly been substituted for oxygen and it is claimed that it is less irritating to the peritoneum and more quickly absorbed than the latter. Even air has been blown through the tubes with an ordinary curved pipet inserted into the cervix. By raising the foot end of the examining table and filling the vagina with water, the escape of air bubbles can be watched if the tubes are occluded. (Heaney.)

Lespinasse employs the following technic in insemination: The penis is washed with soap and hot water, rinsed in sterile water and then covered with a condom which has been boiled. As soon after intercourse as possible, the seminal fluid is drawn into a sterilized syringe to which is attached a small No. 5 woven catheter, of special make, with an opening only at the end. "This instrument will enter the smallest cervix and usually passes readily into the fundus. Once in a while a little manipulation is necessary to pass the internal os, but, as the catheter is soft, no trauma is inflicted and no difficulty encountered in passing any angulation or obstruction. Two to ten minims of semen are injected into the uterus and the catheter is removed. More than ten minims produce uterine colic."

Dickinson has worked out a technic of his own which I shall quote in full.

"During the office examination one selects the shortest or smallest bivalve speculum that will make a good exhibit of this particular cervix in the knee-chest position, and also tests a snug-fitting curved pipet in the internal os. A note or mark is made on the pipet to show how far up ten minims will fill its caliber. After an appointment is made—to follow a week of continence—the husband is given a sterile test tube, dry, and corked. He is directed

to wash carefully and secure a friction specimen about an hour before the appointed time, taking care that the inside of the cork makes no contacts, and to keep the tube warm but not hot, under a warm water bag or in a thermos bottle. He is to verify by telephone a successful production.

"The following are sterilized: bivalve speculum, single tenaculum, two or three pipets in test tubes, applicators cotton tipped, and towel and tray on which to lay out the above. All pipets to be dried.

"At the home, a third person is to be near at hand, though not necessarily in sight. Good illumination is needed—drop light and head mirror preferred. Bladder and bowel are previously emptied. All the materials are spread conveniently at hand. The patient takes a real knee-chest posture at the edge of, or across, the bed. The bivalve gives a clear view of the

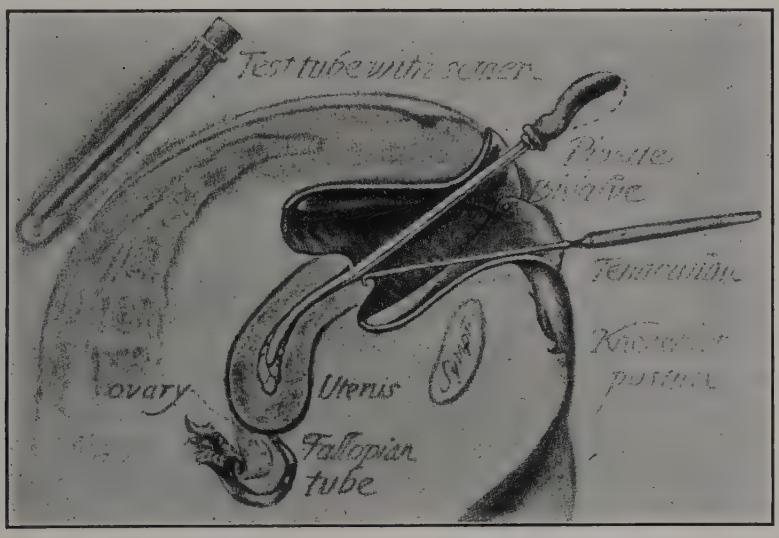


FIG. 103.—DICKINSON'S TECHNIC OF ARTIFICIAL INSEMINATION. See text for details (from R. L. Dickinson, *Am. Jour. Obst. and Gyn.*, 1921, 1:259).

ballooned vagina and also a free play to the uterus such as cannot obtain with this instrument in the dorsal posture (Fig. 103). This free play is important in gaining ready access to the cavity of the uterus. The tenaculum steadies the cervix and serves to draw open the canal, which should rarely need to be wiped and on which no antiseptic should be used. The pipet is now very gently filled above the point known to be ten minims (the uterus holds eight to ten minims). The tip touches first the interior of the cervical canal as high as may be and is passed to near the fundus. The fit to the internal os prevents regurgitation, or, if it does not, one makes a change. Gentle, steady pressure is made on the bulb until 'unwell feelings' are produced, and continued till there is consciousness of slight distress in the side of the abdomen low down, at which time the fallopian tubes are presumed to have fluid in them.

"Then pipet, tenaculum, and speculum are withdrawn. The patient slides on to her side with the hips a little elevated, to remain thus at least an hour.

"The Skene uterine pipet is a bit thicker than a uterine sound and curved like a sound. Its opening must not be minute, as Huhner's curled-up forms of defunct spermatozoa are produced by quick suction through narrow orifices. The advantage over any syringe is that the contents are all in sight, the interior is easily cleaned, and various sizes are at hand. The sharply recurved single hook of Emmet does not give the discomfort of the heavy double forms.

"Three attempts at monthly intervals should be the minimum, and six should be asked."

Opinions as to value and practicability of artificial insemination are still sharply divided. As a rule, only successes have been reported, and these are very few and far between. Moreover, there is, even in skilled hands and with the most rigid precautions, the danger of infection, and necessary repetitions of the procedure increase this danger. Not long ago I had to operate on the wife of a physician who had caused a tubal infection by an attempted insemination! Personally I feel disinclined towards the procedure though I do not deny the gynecologic specialist the right to make use of it in rare and well-selected cases. To the general practitioner, however, the method cannot be recommended as long as it is still a matter of investigation.

Summing up, let us admit to ourselves that on the whole our successes in the treatment of sterility are rather meager.

One or two or at the most half a dozen successful cases a year may be the net outcome of a hundred attempts. Even this small percentage is a source of gratification, though there is often a doubt whether we may take the credit for our good fortune to ourselves.

Under no circumstance should the practitioner *promise* results even if he be convinced that he has found the cause of sterility. Let the prognosis always be guarded.

On the other hand, the patient should never be told that her sterility is intractable. With the exception of very marked developmental anomalies, there is always a possibility of conception, and the physician who has committed himself rashly would suffer in his reputation if a belated child belies his verdict of incurability. Moreover, humane reasons should dictate to him to leave the patient a ray of hope, and the same attitude should be observed towards the husband should he be found to be sterile. The feeling of finality may lead to a most pronounced psychic depression, and there is more than one case on record where an ill-advised expression on the part of the physician has driven the patient to suicide.

OBESITY

The inclusion in a gynecologic book of this subject which is generally considered as belonging to the field of internal medicine requires an explanation.

I might refer to the actual observation that obese women very commonly

consult the gynecologist for the relief of their condition, and further to statistics which show a greater frequency of obesity among women than among men. (Bouchard.) But there are other and more pertinent arguments. Even under physiologic conditions the amount and distribution of the panniculus adiposus shows distinct differences in the two sexes. It is this very panniculus which endows the female body with its beautiful and graceful curves, and in particular the localization of fat about the breasts, buttocks, hips, and thighs may well be regarded as secondary sexual characteristics. A pathologically increased deposition of fat befalls, as a general rule, these same places of the body and may there lead to considerable disfigurements and annoyances. The ungainly enlargements of the buttocks in many climacteric women and the numerous cases of "mammary hypertrophy," where the enormous size of the breasts is due to increase of fat while the gland itself usually is atrophic, are tangible illustrations. Upon the abdomen the superabundant fat hangs downwards in transverse folds causing not only cosmetic deformities but static backache by the weight on the muscles of the back; in such cases the thin region about the navel is pulled apart by the heavy parietes so that we find an umbilical hernia in almost all elderly and obese women. That beneath an enlarged mamma or other pendulous folds of fat the secretion of the skin accumulates easily and produces maceration and intertriginous eczemas is well known. This intertrigo is particularly annoying and refractory to treatment about the vulva where it may give rise to vulvovaginitis, and, even after a cure has been effected, it leaves extensive pigmentations behind.

Pregnancy and lactation very commonly are associated with an increase in the body fat, and in married women, advancing towards middle life, a certain degree of adiposity almost constitutes the typical characteristics of the sex at this period. (Kelly.)

In younger women obesity exhibits a close relationship to the functions of the genital organs. The menses are often scanty, occur at longer intervals, and may even cease altogether. That these phenomena are the result, not the cause, of obesity is shown by the return of normal menstrual conditions after successful treatment for the reduction of obesity. In adolescent and prematurely obese girls, where such anomalies of menstruation are present, it is not easy to say whether the obesity or a hypofunction of the ovaries is the primary factor. In some cases the uterus is found atrophic, and it is well known that obese women are often sterile. If such obese women conceive after all, the subjective disturbances of pregnancy are intensified. In labor there is often a primary inertia of the uterus, and as the adipose abdominal walls are insufficient in their expulsive action, obstetrical operations are more often required and are also complicated, because of the danger of infection from the eczematous external genitals; moreover, extensive deposits of fat about the heart render a narcosis hazardous.

For this reason, too, fat women are poor surgical risks if abdominal operations are indicated; the enormous thickening of the abdominal walls also creates technical difficulties and increases the possibility of infection or liquefaction of the subcutaneous fat layer. The gynecologist is confronted

with this situation in cases of fibroids which are frequently associated with obesity, in contradistinction to ovarian cysts which more often exhibit a tendency towards emaciation.

Just as the normal climacterium, so does the artificial menopause after castration, frequently (but not regularly) lead to obesity.

A rare form of obesity is the adipositas dolorosa. This affection, otherwise known as Dercum's disease, is characterized by the deposit of fat in masses situated in different parts of the body, preceded and attended by pain. It is an affection peculiar to women (in whom it occurs six times more often than in men) and appears during the middle period of life. Neuralgic pain associated with the fatty masses occur in different parts of the body. Sometimes the fatty deposits become so large that they form huge, pendulous masses; they never appear on the hands or feet. This affection differs from other varieties of obesity by the pain associated with it and by the irregular distribution of the fat. In some cases of the affection the thyroid gland has shown a marked tendency to atrophy. (Kelly.)

Pathologic adiposity in its last analysis is always due to a disproportion between the amount of food taken in and the amount used up by the body. In the majority of cases, this disproportion is caused by external circumstances (exogenous etiology), in such a way that either there is an excessive amount of food or calories consumed, or the lack of physical activity leads to inadequate oxidation of the foodstuffs associated with excessive absorption of the materials which produce fats, or else both these factors are combined in the same case.

In some individuals the energy of oxidation is reduced or perverted, even though the intake of food is normal, both qualitatively and quantitatively. The result is a pathologic increase of adipose tissue. Some of these women are distinctly poor eaters. Fat metabolism is as yet imperfectly understood, but this much is certain that it is under the control of the internal secretions (endogenous etiology). According to the authorities, chief among them von Noorden, the main source of endocrine disturbances in this respect is a hypofunction of the thyroid. The thyroid may be diseased primarily or it may be affected secondarily by disturbances in other endocrine glands.

It seems that these endogenous or, as they are also called, constitutional, factors occur more frequently than is generally assumed, and they make it easier for the above described exogenous factors to exert their influence.

Obesity, therefore, is only a symptom of a number of different diseases or conditions and in order to facilitate a rational treatment according to the etiology in the individual case, von Noorden has suggested the following classification:

I. Exogenous Adiposity.
   A. Overfeeding.
   B. Inactivity.
   C. Combination of overfeeding and inactivity.
II. Endogenous (constitutional, thyrogenous) adiposity.
   A. Primary thyrogenous adiposity caused by atrophy, degeneration,

functional weakness, etc., of the thyroid, either congenital or acquired.

B. Secondary thyrogenous adiposity, that is, the functional weakness of the thyroid is due to disturbances in other endocrine glands:
   1. Ovaries (hypofunction or absence).
   2. Hypophysis (Froehlich's syndrome).
   3. Other endocrine glands (pancreas, epiphysis, thymus).

III. Combination of exogenous and endogenous adiposity. Probably very frequent, particularly in the young. Constitutional factors (II) prepare the ground so that exogenous factors (I) lead to adiposity more easily than in persons with normal metabolism.

We have seen in Chapter III that the endocrine glands influence one another both under normal and pathologic conditions and we can now, on the basis of this classification, understand and trace to their origin some of the forms of obesity peculiar to women which were enumerated in the first part of this discussion. This same classification will also enable us to pursue, as far as possible, a causative treatment. In the majority of cases this will be a dietary therapy. To give here detailed diet lists is obviously outside the scope of this book and the reader is advised to consult the works of Osler, Friedenwald and Ruraeh, von Noorden, Kraus and Brugsch and other writers. Only a few general remarks are in order. A fat reduction treatment does not mean a starvation treatment. The food must be voluminous because it contains fewer calories. A hunger cure causes nervousness, leads to fainting spells and attacks of vertigo and, most of all, weakens the heart. It is far better to try to reduce the weight slowly. Too rapid a loss may bring on an enteroptosis with uterine displacement and prolapse. Moreover, such patients look haggard and old beyond their years. The gradual reduction of obesity by diet must be conscientiously carried out by the patient and continued for a long time to prevent recurrences. There is, therefore, a great deal of educational influence necessary, a sort of psychotherapy, and it is always a hard task to break adult people of bad habits, in this case, of the habit of overeating. It may be added, parenthetically, that obesity is often hereditary. Therefore, where the family history shows a tendency to adiposity, it is a wise plan to institute prophylactic measures against overeating during childhood.

The dietary treatment is supported by an increase in bodily activity. Physical overtraining, however, even if the fat person, who is habitually lazy, were willing, has this disadvantage that it makes the patient too hungry and then she is apt to eat too much. The muscular work demanded of the patient, therefore, must be carefully graded according to the patient's capacity and only slowly increased. The exercises in question are walking, up to four and five hours a day; medical gymnastics (Chapter XIX) for those who are engaged during the day; so-called Swedish exercises on special apparatus; outdoor sports such as tennis, swimming, skating, bicycling (if obese patients take to horseback riding, it is usually only the horse that loses

weight); finally, hydrotherapy as discussed in Chapter XVII. Women of means may be sent to some watering place such as Carlsbad, Marienbad, or, in this country, to the Hot Springs of Virginia.

In the treatment of constitutional obesity, the administration of thyroid extract is the essential factor. The indiscriminate use of this remedy, which should be given only in small doses of from one to two grains three times

FIG. 104.—GENERAL ADIPOSITY IN A VIRGINAL PATIENT AFTER THE MENOPAUSE.

a day, is extremely dangerous. Such patients must be kept under constant and close observation, and should there be any indications of injurious effects manifested by tachycardia or arhythmia, suffusion of the face, syncope, vertigo, marked headache, or lowering of the blood-pressure, the medicine must be stopped at once. Von Noorden considers it very important not to restrict the diet too much during the thyroid treatment and to give proteins in sufficiently large quantities. The urine should be tested for sugar at fre-

quent intervals. Tachycardia and lowering of blood-pressure can be prevented by small daily doses of some digitalis preparation. While von Noorden feels that other endocrine substances may be dispensed with, other authors hold that their combination with thyroid extract is useful in suitable cases. I believe that the combined use of ovarian and thyroid preparations has been very successful in a number of cases of youthful obesity with menstrual

FIG. 105.—ABDOMINAL SUPPORT CONSTRUCTED FROM A PLASTER CAST OF THE ABDOMEN.

anomalies, and I have also seen some very striking results with thyroid and hypophyseal medication in a few cases of obesity where I considered the pituitary body primarily at fault. Among the many writers on the subject, Lereboullet may be selected at random. He also believes that in the endocrine obesity of children, pituitary or suprarenal extract seemed to increase the efficacy of thyroid treatment. I appreciate the doubtfulness of any therapeutic conclusions drawn from a limited number of observations and the uncertain foundation of organotherapy in general, but I feel that the addition

of some endocrine preparation according to the probable etiology can do no harm.

Where the weight of the excessively obese abdomen causes distress, a suitable corset should be prescribed. In the general run of my cases, a stout maternity corset has given satisfactory results. In particularly huge cases of monstrous size, specially built appliances are needed (Fig. 104). I repeatedly have had to construct a sort of plaster jacket, such as the orthopedists apply to spinal deformities, by taking a cast of the abdomen and thereby have restored the helpless patients to a reasonable amount of comfort and locomotion (Fig. 105).

LITERATURE

Sterility

Adler. Die mangelhafte Geschlechtsempfindung des Weibes, 1904.
Bab. Samml. klin. Vortr., 1909, No. 198, 200.
Dickinson. Am. Journ. Obst. and Gynec., 1921, 1:255.
Dickinson and Smith. Am. Journ. Obst., 1913, 68:686.
Duncan. Sterility in Women, 1884.
Fraenkel. Samml. klin. Vortr., 1907, No. 168, 169.
Gellhorn. Journ. Missouri State Med. Assoc., November, 1913.
Heaney. Tr. Am. Gynec. Soc., 1923.
Huhner. Med. Rec., May 9, 1914; also New York State Journ. Med., February, 1921.
Hunner. Tr. South Surg. and Gynec. Soc., Atlanta, 1913.
Lespinasse. Internat. Clin., 1918, 1:49.
Mathews. Surg., Gynec., and Obst., 1906, 2:509.
Nassauer. München. med. Wchnschr., 1920, 67:1463.
Opitz. Therap. d. Gegenw., 1914, 55:14.
Pozzi. Tr. Am. Gynec. Soc., 1909, 34:360.
Rohleder. Die Zeugung beim Menschen, 1911.
Schenk. Path. u. Ther. d. Unfruchtbarkeit des Weibes, 1903 (with extensive literature).
Schlesinger. Med. Klin., 1920, 16:125.
Sturmdorf. Internat. Clin., 1920, 1:137.

Obesity

Anspach. Gynecology, 1921.
Bouchard. Maladies par ralentissement de la nutrition, 2d ed., Paris, 1885.
Friedenwald and Ruraeh. Diet in Health and Disease, 1905.
Kelly. Medical Gynecology, 1908.
Kraus and Brugsch. Therapeutische Technik, edited by Schwalbe, Leipzig, 1921.
Lereboullet. Paris Médical, 1922, 12:386.
Noorden, von. Therap. Monatschr., 1915, 29:16; also Die Fettsucht, 2d ed., Vienna, 1910.
Novak. In Nothnagel's Spez. Pathologie u. Therapie, 1912.
Osler and McCrae. Principles and Practice of Medicine, 1920.

PART II

GYNECOLOGICAL TECHNIC

CHAPTER XIV

TAMPONADE

Vaginal Tamponade.—Vaginal tampons are pieces or strips of absorbent cotton folded about themselves and tied in the center with a string long enough so that the end will project from the vagina. They are made in any size or shape desired. Instead of absorbent cotton, ordinary, non-absorbent cotton or lamb wool may be used but has no particular advantage over the absorbent cotton which is always at hand in a doctor's office.

Vaginal tampons serve three purposes: (1) to convey medicaments to the vagina and cervix; (2) to support the pelvic organs; (3) to arrest hemorrhage. The first two indications are met with in the treatment of subacute and recurrent chronic inflammations of the pelvic organs where they are combined with other therapeutic measures. The medicines more commonly

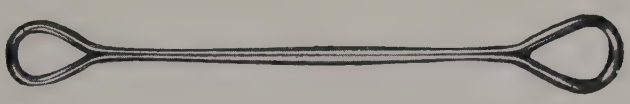


FIG. 106.—THE VAGINAL "DEPRESSOR."

used are glycerin, boroglycerid (a solution of boric acid in glycerin) ichthyol, 10 per cent in glycerin, tincture of iodin in glycerin, enough to give the solution a light yellowish-brown tint. The essential part is the glycerin, which by its hygroscopic properties attracts fluid from the inflamed and edematous tissues and thereby depletes them. This purpose is, however, not accomplished in the usual manner in which the treatment is given. Most physicians dip one or two loose tampons into the glycerin and introduce it into the vagina. Applied in this way, the liquid very quickly escapes and the tampons are pushed towards the vaginal entrance before any effect can be produced. The method, therefore, has undeservedly fallen into discredit. Used in the following manner, tampon treatment will be found very useful in many cases. The patient lying on her back on the examining table and the pelvis raised, the vagina is spread apart with a bivalve speculum and one half to one ounce of glycerin is poured into the vagina through a funnel. Then, according to the capacity of the vagina, eight to twelve small tampons, attached to each other at various distances by a string, are systematically packed one after the other, first into the posterior fornix, then into the lateral and anterior vaults, and finally into the remainder of the vaginal canal. The left hand armed with a "depressor" (Fig. 106), merely an elongated finger, opens up the exact place where the dressing forceps in the right hand deposits the tampon. Gentleness prevents any sensation of pain. The first few tampons absorb

the solution, the rest remain dry and prevent the escape of the glycerin for some time. The thread of the last tampon is left long and hanging out of the vagina. After about six hours a profuse watery discharge ensues which continues until the patient removes the entire string of tampons twenty-four hours after the introduction. Following this or, better still, before going to bed, she takes a prolonged hot douche, as described on page 161, and returns for another treatment the next day. This solid packing of the vagina also secures for the inflamed and sensitive parts a complete rest, and for this reason the pain quickly subsides, in analogy with the effect of immobilization of inflamed structures in other parts of the body.

Carried out in the manner described, a sufficient improvement is often achieved by from four to six treatments, as contrasted with the weeks and months that the ordinary method of application consumes. To be sure, there are cases where this treatment is irritating to the vaginal mucosa; other means must then be employed. Several kinds of medicated tampons of lamb's wool are prepared by various pharmaceutical concerns. While they are superior to the absorbent cotton tampons in ordinary use, they are not as effectual as the string of tampons described above.

Aside from inflammation, this method offers advantages in the treatment of subinvolution and relaxed vaginal walls soon after the puerperium. In these cases, alum or tannic acid must be incorporated in the glycerin. The uterus becomes depleted and the combined effect of the drying-out and astringent agents renders the hyperemic vaginal walls firm. At the same time the uterus is pushed upward and into anteversion and the danger of retrodisplacement and prolapse averted. In this manner an operation can often be prevented and the subjective sensations of bearing down and pressure be relieved.

Occasionally, the vaginal tampon may be used as a preliminary step in the pessary treatment of retroflexion. Where replacement by any of the methods described in Chapter IV is not successful, two or three *tightly* wound tampons which are coated with vaselin may be pushed into the posterior fornix; the foot end of the table is to be raised during the procedure. On removing the tampons the next day, the physician will sometimes find the reduction of the uterus as easy as it was difficult the day before—provided, of course, that the uterus lies in movable retroflexion.

Where we wish to treat a subacute vaginitis with antiseptic ointments as for instance in gonorrhea (Chapter V), a smaller number of tampons impregnated with the medicine suffices to bring the preparation into contact with all parts of the affected mucosa.

In cases of sudden and abundant hemorrhages the practitioner may find himself obliged to pack the vagina to save the patient's life. Such alarming losses of blood may occur from cervical cancers, submucous fibroids, injuries, criminal abortion, or ruptured varices. There may not be time to search for the cause of the bleeding and to remove it. The country practitioner in particular, will be wanting the necessary facilities and assistance to do more than to check the hemorrhage for the time being by a firm tamponade. When that is done and the acute anemia improved by appropriate medicines

or hypodermoclysis, the exact diagnosis may be made. In such an emergency, the vagina must be packed so tightly that no more blood can escape. The vaginal packing should remain in place for several days, lest, on removal of the tamponade, the thrombi be torn off and the hemorrhages again be started. This vaginal tamponade requires a definite technic. Bladder and rectum should, if possible, be emptied. As packing material in an emergency, the ordinary gauze roller bandage, which is sold in sterile packages and carried in most doctor bags, is wrung out of a weak lysol solution (avoid bichlorid because of the danger of poisoning!), and introduced through a speculum. A dressing forceps carries the gauze, systematically, first into the fornices, then into the rest of the vagina. A number of rolls may be used, until the

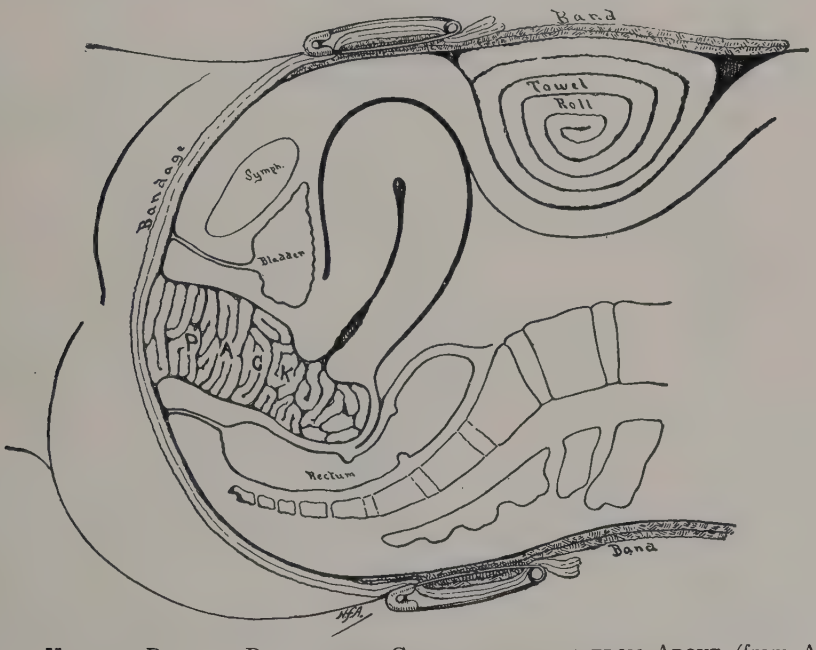


FIG. 107.—VAGINAL PACK IN PLACE, WITH COUNTERPRESSURE FROM ABOVE (from Anspach, *Gynecology*).

entire vagina is filled. The procedure is painful and requires gentleness. It is a mistake to push the whole roll forcibly into the vagina. In pregnancy the vaginal walls are so soft that they tear easily. The same may happen in very old women in whom the thin and atrophic vagina may break under the pressure of a large tampon forced inward.

After the tamponade is finished, counter pressure is applied—from above by a sand bag or the like, from below by an improvised T-binder (Fig. 107). The legs are tied together, and a small dose of morphin injected, hypodermatically, to enable the patient to bear the pain.

If the vagina has been packed properly, the urethra is compressed to such an extent that regular catheterization becomes necessary. The temperature has to be taken three times a day. If this remains normal, the physician begins after 24 hours to pull out the gauze very gradually, taking 3 to 4

days before all of the packing is removed. If there is fever, indicating decomposition, the tampon must be removed at once and an antiseptic douche be given.

Cotton can be packed into the vagina even more tightly than gauze. The cotton tampons are squeezed out of a weak lysol solution (½ per cent). Two fingers of the left hand are passed as high as possible into the vagina to press the latter downward and the tampons are introduced with a dressing forceps in the other hand, in the systematic manner detailed above. The pain of the procedure is materially diminished by packing the vagina through a speculum. The tampons should be attached to each other and counted, lest one be left behind and cause decomposition, offensive discharge, or even infection.

Occasionally, after the application of a volsellum to the vaginal portion, scarification, or some other local treatment of the cervix, there is some bleeding which does not stop spontaneously. It is advisable in such cases to pour equal parts of boric and tannic acid into the vagina and to keep the powder in contact with the bleeding place by means of a tampon. In a few instances I have seen veritable hemorrhages where this precaution was omitted.

Uterine Tamponade.—The tamponade of the uterus is made only with gauze strips. Many physicians pack the uterus after every curettage unless there is fever and the uterine contents are decomposed. The advantages are: (1) security against hemorrhage; (2) the uterine canal is kept open; (3) the surface of the uterus remains in contact with the disinfecting impregnation of the gauze; (4) on removing the pack, any remnants of scrapings or blood clots are evacuated.

Sudden and alarmingly abundant hemorrhages from the uterus should be checked by uterine tamponade if conditions permit. This refers to hemorrhages of abortions, submucous fibroids, polyps, and those in the climacterium, leaving placenta praevia and other obstetrical causes out of consideration. This uterine tamponade is more effectual than vaginal tamponade, but carries with it the danger of infection. Careful disinfection of the vagina is, therefore, indispensable even in urgent cases. The tamponade, of course, is only a temporary measure and merely serves to protect the patient during the transport to a hospital. In an abortion, the gauze is soaked in a ½ per cent lysol solution; in all other cases it is moistened with an adrenalin solution (20 drops in a pint of water). Finally, tamponade may be employed to introduce chemicals into the uterine cavity.

The cervical canal must be wide enough to insert the gauze without difficulty. In the hemorrhages mentioned above, or after curettage, this is usually the case. Otherwise the canal must be dilated sufficiently (Chapter XVI). A weighted speculum (Fig. 108) is introduced, the vagina thoroughly washed out with dripping bichlorid or lysol sponges and the anterior lip of the cervix grasped with a volsellum. The narrow strip (¼ to ½ inch wide) is brought close to the external os and very gently pushed just above the internal os with a slender dressing forceps or a uterine packer (Fig. 109). The latter is particularly useful for this purpose. More and more gauze is then pushed inward until the entire uterine cavity is filled. Gentleness is

very essential, as the dressing forceps or packer, if handled with too much force, may glide off and perforate the uterus.

FIG. 108.

FIG. 109.

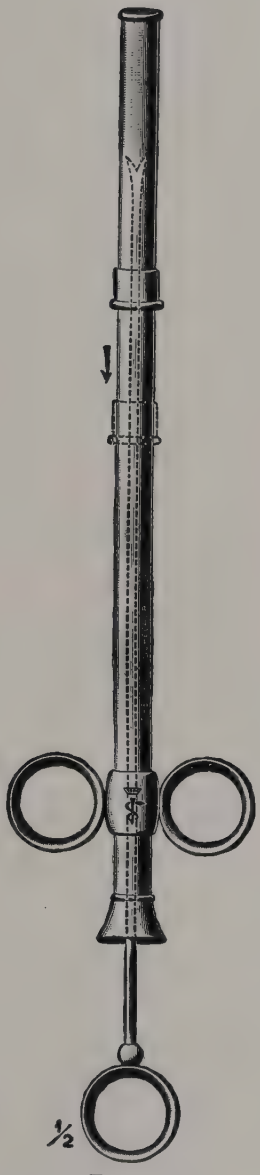


FIG. 110.

FIG. 108.—WEIGHTED SPECULUM (Kny-Scheerer).

FIG. 109.—UTERINE PACKER. Note the notched tip which facilitates the insertion of gauze strips into the uterus.

FIG. 110.—ANOTHER MODEL OF THE UTERINE PACKER. The ring on the metal tube can be moved up or down according to the length of the uterine canal.

A very practical instrument is also the intra-uterine packer which is sold in various sizes (Fig. 110). Contamination on the way to the uterine cavity can thereby be avoided. Sterilized gauze strips with or without antiseptic

impregnation are sold in test tubes. The end of the strip is left in the vagina near the vulva to facilitate removal after twelve, at the latest twenty-four, hours. On removing the volsellum from the cervix, care must be taken not to pull out the packing inadvertently. At the conclusion of the tamponade, the uterus must be brought back into normal position by bimanual palpation because every uterus, on being pulled downward, assumes a retroverted position.

CHAPTER XV

LOCAL TREATMENT OF CERVIX AND CORPUS UTERI

Topical Applications.—For purposes of local treatment of the cervical canal and uterine cavity, certain astringent or mildly cauterizing solutions are brought into contact with the mucous membranes. Alcoholic solutions are better than aqueous ones because they diffuse rapidly over the surface and even penetrate a little into the mucosa. Tincture of iodin (50 per cent), formalin (25 per cent), picric acid (5 per cent), nitrate of silver (10 per cent) are most commonly in use; ichthyol, pure or with glycerin, is also a useful preparation. Chlorid of zinc, sesquichlorid of iron, and carbolic acid must be warned against; their destructiveness cannot be gauged beforehand, and tissue defects may occur which later may possibly lead to atresia. Three such cases following the use of carbolic acid have fallen into my hands and had to be subjected to extirpation of the uterus.

The solution selected is conveyed to the uterus by a cotton-wrapped Playfair sound (Fig. 111), or a thin and pliable applicator of aluminum, copper, hard rubber or other material. The cotton should be wrapped so tightly that it cannot slip off during the treatment. The applicator thus "armed" must be sterile. Every practitioner should have an Arnold or similar simple steam sterilizer; if this is not the case, a number of such applicators should be sterilized in a convenient hospital, or they may be kept in a glass jar filled with any of the solutions mentioned (Fig. 112).

For the treatment itself, the cervix is exposed in a speculum, steadied by a hook or volsellum, and carefully cleansed with bichlorid or lysol sponges. The cervix is then dilated, if necessary, by any of the methods described in the next chapter. This, of course, must be done in narcosis, if a curettage is contemplated at the same time. For ordinary purposes, local anesthesia is sufficient. Several applicators are now introduced in quick succession; the first merely removes the mucus, the second and third distribute the solution over the entire surface. The uterus rapidly contracts from the intense irritation, particularly at its narrowest point, the region of the internal os. If this becomes occluded, the contracting muscle squeezes the solution out of the applicator and forces it into the tubes whence it may reach the peritoneal cavity. Surprisingly small quantities can produce such an effect, as has been proved experimentally. The immediate result is a most intense colicky pain in the lower abdomen which may last for many hours. In not a few cases, the toxicity of the solution has led, in addition, to collapse and even death. It is, therefore, essential to have sufficient dilatation.

To make certain that the internal os cannot contract during the treatment, Peaslee, Zweifel, Zangemeister and, more recently, Sigwart make their appli-

cations through a cannula of glass or metal which is introduced into the cervix and extends just above the internal os. After the treatment a thin and narrow strip of iodoform gauze may be inserted to be removed by the patient about six hours later. In the place of applicators, a modified Braun syringe (Fig. 49) the tip of which is wrapped with cotton may be used. The original Braun syringe with a single opening at the tip has proved to be so dangerous an instrument that it should altogether be banished from the practitioner's office. The treatment is given twice a week and may be

Fig. 111.

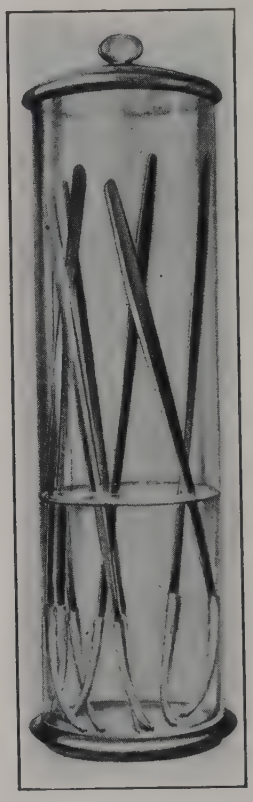


Fig. 112.

Fig. 111.—Spiegelberg's Applicator. Cotton wound around the roughened tip will adhere well when making intra-uterine applications (Kny-Scheerer).

Fig. 112.—Glass Jar Containing Intra-uterine Applicators in Fluid.

kept up for three weeks in all. It is a mistake to cauterize the mucosa steadily for many weeks or months. If there is no result after the time specified, some other treatment should be chosen.

Matthes recommends the following technic: Two thin rubber catheters are introduced into the uterus through a speculum. One of the catheters is connected with a small syringe and filled with a 2 per cent formalin or ½ per cent silver nitrate solution. Only ½ c.c. is injected at one time; the fluid escapes through the other catheter or between the two. If only one catheter can be introduced because of stenosis of the internal os, not more

than three drops are injected so as not to cause overdistention. After the injection, the vagina is filled with kaolin or some other powder.

Erosions need not be treated separately as was the custom years ago; they heal spontaneously as soon as the pathologic process in the cervix or uterine cavity has been cured. There is, of course, no objection to touching them with the same agent that is used inside the uterus.

The principal field for local applications is in chronic infectious or catarrhal conditions in the cervix characterized by hypersecretion, and in chronic hyperplastic affections of the endometrium such as subinvolution which manifest themselves in prolonged and profuse menstrual flows. Nowadays radiotherapy has to a large extent taken the place of local applications. The bleeding is very promptly checked by X-ray or radium treatment, and the latter is also very valuable in the treatment of chronic endocervicitis. I have cured several very obstinate cases which had resisted local treatment, by inserting a capsule with 50 mg. radium into the cervical canal for six hours. In young women, however, in whom radiotherapy is not desirable because of its possible effect on the ovaries, local treatment is quite legitimate.

As a general proposition, intra-uterine treatment is probably employed too frequently. Crossen, who is rather skeptical as to the value of this treatment, calls attention to the harm that may come from it. It may cause the patient to come to the office when she should be resting at home, or convert a neurasthenic or hysteric individual into a confirmed invalid by fixing her attention on some trivial local disturbance; it may, further, carry infection into the uterus and change some simple disturbance into a very serious one; and, finally, it may increase a bacterial disturbance already in the uterus, as evidenced by a chill and a sharp rise of temperature within a few hours after an intra-uterine application. These objections are very well taken, and the practitioner would do well to select the cases for this treatment very carefully, to observe strictly the rules of asepsis and antisepsis, and to institute the treatment only after a thorough gynecologic examination and study of the case have convinced him that there is no acute or subacute infection in the uterus or its surroundings.

Electrocauterization of the Cervix.—Thermocauterization of the cervical canal often yields remarkably good results in chronic inflammation or eversion due to lacerations. Hunner, who has popularized this method in America, makes deep radial incisions through the mucosa with the Paquelin cautery, if the canal admits the instrument. A slender, slightly bent point, resembling somewhat a uterine sound, should be selected. Where the external os is small, the bright red burner is pushed deeply into the canal once or twice. In the majority of the cases, there is very little if any pain and the procedure can be performed in the office if the necessary facilities permit.

The method has been considerably improved by Dickinson, who makes use of the delicate *electrocautery employed in rhinologic practice.* His description is so graphic and stimulating that I quote from it at length.

"The nasal cautery has a not inconsiderable field between the simple raw areas and catarrhs that respond to a couple of applications, and the major injuries that need hospital work. Even among the latter there are some

cases so benefited by preliminary treatment that their surgery is simplified. In a number of instances where the patient has been obliged to postpone operation for a major condition of the cervix, and this palliative treatment was used to relieve symptoms, I found operation in the end unnecessary because the healing was enduring and the inroll sufficient. Furthermore, any measure that will abbreviate office treatment and obviate the pelvic obsession of the chronic office habitué is to be welcomed.

"The cases responding particularly to this treatment happen to be especially rebellious to others. The worse they are, the more they are adapted to the hot wire. These are:

1. Rough and extensive granulation, with eversion.
2. The cysts, superficial or deep (these recur sometimes after repairs).
3. Voluminous, adhesive mucous catarrh of the canal.
4. Gonorrheal free secretions, with thickened lining.
5. Between-birth erosions and lacerations (recurring with each labor, if sewed in the interim).
6. Patients whose physical condition precludes, or whose circumstances postpone, operation.
7. Marked endocervicitis in virgins (because the visits are few)."

The necessary outfit consists of a handle (Fig. 113), various attachments

Fig. 113.—Electrocautery Handle and Burners for Work on Cervix.

of different size and shape, and a transformer. The whole apparatus is tested before each treatment; the cautery point is heated to a cherry red. The metal speculum exposing the cervix may become too hot if the treatment takes too much time. I then use tubular specula or retractors of wood (Fig. 114) but this is not often necessary. The patient must be instructed to lie very quiet. Should she move unexpectedly the physician may be unable to withdraw his instrument in time to keep from burning the vaginal wall.

I quote again from Dickinson: "On granular areas a tiny gutter is swiftly burned at ¼ inch intervals." [While Dickinson makes longitudinal incisions

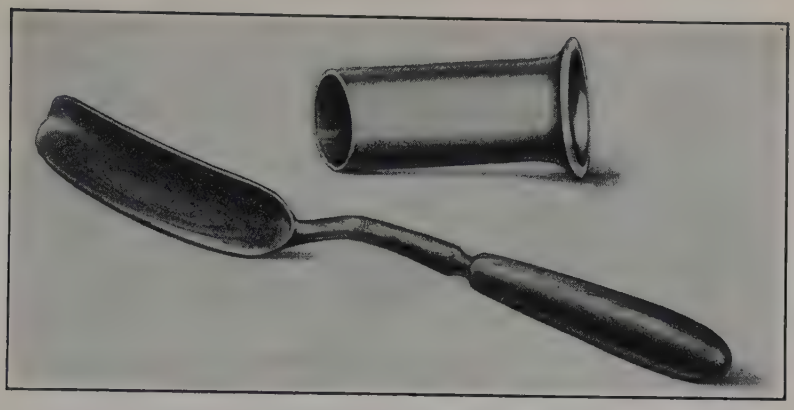


FIG. 114.—TUBULAR SPECULUM AND RETRACTOR OF WOOD ARE SOMETIMES USEFUL TO PROTECT THE OUTER PARTS FROM THE HEAT OF THE CAUTERY.

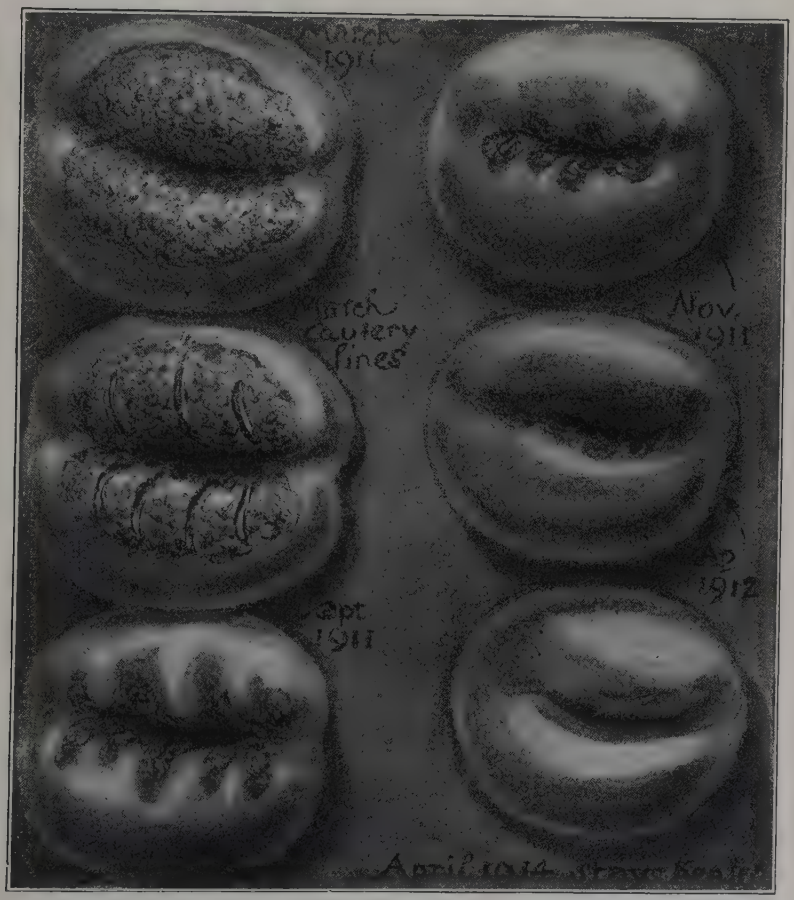


FIG. 115.—LACERATION WITH EVERSION AND GRANULAR SURFACE, LIFE-SIZE. CAUTERY-LINES AT FIRST TREATMENT. Absent for six months—demonstrating possibilities from single application. November shows effect from second treatment. A third in April gave the permanent healing, and shrinkage and inroll seen in lower drawing, so that operation was not required (this and the following four illustrations are from R. L. Dickinson, *Am. Jour. Obst. and Gyn.*, 1921, Vol. 2).

as seen in his picture (Fig. 115), others burn transversely across the everted mucosa.] "For small areas punctures are made. Repetition once in ten or fourteen days is the average, two or three treatments sufficing." [Personally, I find an interval of four weeks preferable; all signs of the burn have disappeared by this time. Progressive scar shortening does the inrolling later.]

"For erosion with edema, shrinkage with boroglycerid can precede the cautery. Sticky secretion must be cleared away before the cautery is used. Narrow rough gauze twisted in the canal does this best. The wide gonorrheal canal is treated with two stripes, the narrow by punctures.

"Obstinate adhesive catarrh behind a somewhat narrow external os we have been in the habit of treating by stretching the opening and using a tiny sharp curet on the canal (Fig. 116). The sensation imparted by the gristly lining of these long standing cases is as if one were scraping over the back of linoleum or Brussels carpet. This is the very condition for which the delicate cautery stripe works promptly. The canal is carefully dried out, the single tenaculum steadies it, and a longitudinal application is made on the

Fig. 116.—Aggravated Catarrh of the Cervical Canal with Distention and Thickened Lining. Reduced below life size, yet demonstrating the large amount of retained, inspissated mucus. The canal is cleared and the fine tip lays a stripe on opposite sides of the passage (Dickinson).

two opposite sides of the wide oval passage. If necessary the side not touched may be striped two weeks later. Undue contraction of tender scars have not resulted from any of these procedures." [This statement I can confirm from personal experience.]

"The cystic cervix is especially adapted to cautery treatment (Fig 117). There are some cervices so riddled with deep cysts that only complete amputation will relieve the pressure-ache. But even these are worth trying to cure with the fire-needle. Only, if one fails and desists, he must defer operation until the suppuration has entirely disappeared. . . . The cysts that the finger feels and the eye cannot find may be made visible by fingertip pressure, quick exit of the finger, and a stab at the blanched spot that remains just long enough to reach. The tenaculum draws open the canal for interior nabothian distentions. For deep punctures the wire is to be very hot in order to keep on penetrating. In vascular and varicose womb mouths (Fig. 118), the wire should carry as little heat as possible—unless a decongesting

ooze is desired. The amount of relief afforded by opening cysts is evidenced by the return of patients with the request that the old ache be eased. They

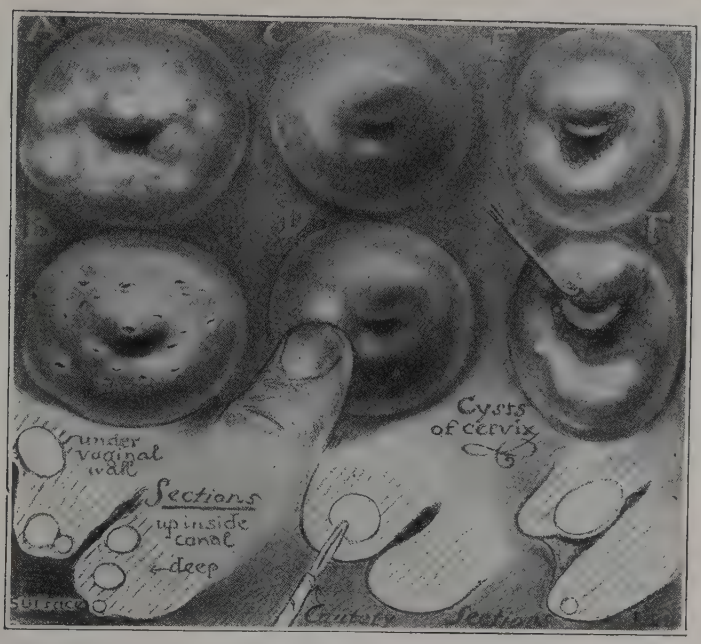


FIG. 117.—CYSTS OF CERVIX (REDUCED BELOW LIFE SIZE, AS SHOWN BY SIZE OF FINGER). *A*. Multiple cysts in various locations. *B*. Gaping openings left a few days after cautery puncture. *C*. Cervix without visible evidence of cyst, yet presenting to the finger the characteristic feel. *D*. The finger makes pressure and blanches the surface over the cyst, and the wire cautery tip at once stabs this spot, as the section shows. *E*. Cyst deep in canal. This is brought to view by tenaculum in *F* (Dickinson).

recognize the recurrence of tension. The puncture is curative, the intervals of recurrence lengthening from months to years.

"Polyps are best handled with the cautery tip, if the stalk is accessible

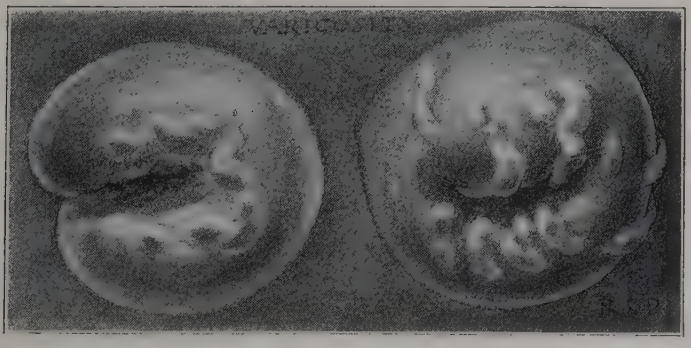


FIG. 118.—VARICOSITIES OF THE CERVIX OF UNUSUAL SIZE TREATED WITH A LOW DEGREE OF HEAT IN THE WIRE (Dickinson).

(Fig. 119). If not, the fine wire loop works better. Varicosities of the cervix are part of a general pelvic venous stasis and so of themselves are

of little moment. A swollen varicose cervix may 'drag.' In this case a low-heat puncture of any visible veins shuts them off and shrinks the cervix."

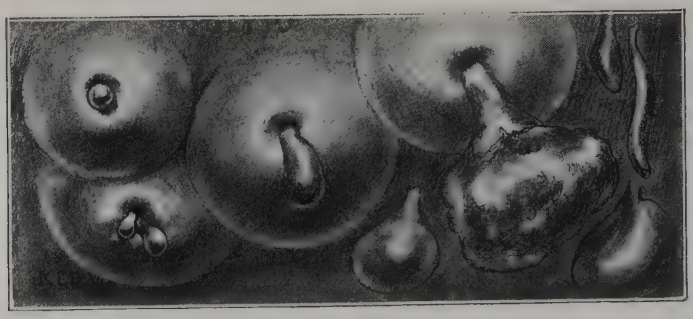


FIG. 119.—CERVICAL POLYPS. (Not life size) removed at base by hooked cautery wire slid up the stalk (Dickinson).

Thermocauterization within the cervical canal is painful in a certain percentage of the cases, in one out of three or four, according to Dickinson, while the outer surface of the cervix is free from sensitiveness.

The method can be recommended highly for office practice.

Scarification.—Another method of relieving an edema of the cervix is scarification. Any long, thin, and pointed knife may be used for this purpose, *provided it is very sharp.* A good many specially designed scarifying knives are on the market; Fig. 120 shows the model which I have found particularly useful. The cervix is exposed in the speculum and steadied with a sharp hook. Stabs are made close to the external os where the sensitiveness is least marked. Excessive bleeding need not be feared even if the puncture is as deep as 1 cm. or more. Only if the vaginal wall has been accidentally stabbed, may the bleeding be so copious as to require a suture.

FIG. 120. SCARIFYING KNIFE (Kny-Scheerer).

Nabothian cysts (Fig. 54), which appear in the form of grayish or yellowish round prominences ranging in size from that of a millet seed to that of a small cherry, are punctured by the knife, but the opening should be made a little larger, lest these retention cysts form again.

To obtain the full effect of a scarification, about two tablespoonfuls of blood should be let out. This quantity cannot always be obtained when the scarification has been repeated a number of times. After the treatment, a tampon soaked in glycerin is placed against the cervix to check further bleeding and to increase the depleting action of the procedure.

Scarification is also of decided value in the treatment of climacteric headache which occurs about the menstrual date. The patients suffer intensely, as has been described in Chapter VII, but can find no relief from internal medication. The headache is often associated with an almost unbearable sensation of fullness

in the pelvic region. In these cases scarification acts as if by magic and the patients feel relieved even before they leave the examining table.

Occasionally the cervix may be scarified when younger women complain of abnormally scant menstruation. The benefit derived is largely due to suggestion; but I have repeatedly observed that the menstrual flow which occurred within a day or two after the treatment was unusually copious.

LITERATURE

CROSSEN. Diseases of Women, 4th ed., 1917, 393.
DICKINSON. Am. Journ. Obst. and Gynec., 1921, 2:600.
MATTHES. Wiener klin. Wchnschr., 1919, 32: 849.
SIGWART. München. med. Wchnschr., 1923, 70: No. 2.
ZANGEMEISTER. Therap. Monatshefte, 1914, 28:170.

CHAPTER XVI

AUXILIARY PROCEDURES

Dilatation of the Cervix.—Dilatation serves two purposes: (1) as a preliminary to any intra-uterine instrumentation or manipulation, (2) as a treatment for stenosis of the internal os.

A curettage or intra-uterine cauterization can be performed properly only through a dilated cervical canal. The former requires a dilatation of one third of one inch, but the wider the canal is, the more thorough is the curettage apt to be. The need of sufficient dilatation for intra-uterine applications has been dealt with in the preceding chapter. Digital exploration of the uterine cavity necessitates a dilatation of about three fourths of an inch. We resort to this method only when persistent hemorrhages or other uterine discharges exist which we are unable to diagnose by other means of exploration. We may further employ it in certain cases where retained products of gestation are to be removed ("finger curettage").

Stenosis of the internal os may be due to a true stricture of fibrous tissue or a spasm of the musculature. The consequence is dysmenorrhea and, at times, sterility. The subject has been discussed in previous chapters. Dilatation is indicated only in cases of fibrous stenosis.

The technical difficulties of dilatation vary greatly in the individual case. In certain instances the procedure may be quite easy. These are the cases in which polyps, submucous fibroids, or parts of the ovum are being expelled with abundant bleeding and a spontaneous dilatation is already under way; soon after a miscarriage or confinement the tissues are soft and offer no resistance to our dilating measures. In virgins and nulliparous women, on the other hand, or in multiparous women with elongated and hypertrophic cervices, the procedure may be extremely difficult.

Dilatation is contra-indicated in the presence of any acute or subacute inflammation of the adnexa, particularly a pyosalpinx, but, even in chronic processes, caution is needed, lest a recrudescence of the infection be the result.

We have three methods at our disposal: (1) dilatation with metal instruments, (2) slow dilatation with laminaria tents, (3) gauze packing.

1. Metal dilators are slightly curved, smooth bougies with conically rounded tips (Fig. 121); *those with pointed ends should be avoided because of the danger of perforation.* They are 3½ inches long and are numbered according to their caliber. The diameter of the thinnest instrument is that of an ordinary uterine sound (2 mm.); the largest to be used for our purpose is 20 mm. (⅔ of an inch) in thickness.

The introduction is painful and requires narcosis. It should take place

in a hospital if possible. Only for purposes of intra-uterine applications, if the cervix is yielding and only the thinner numbers need be used, may the dilatation be performed without a general anesthetic and in the office. Even then local anesthesia is advisable (see below).

The patient lies in lithotomy position; the bladder is emptied, and vulva, vagina, and cervix are carefully disinfected. The examiner makes a thorough bimanual examination with disinfected and gloved hands to determine the position of the uterus. The abdomen is covered with a sterile towel to safeguard the cleanliness of the outer hand. The cervix is now exposed by a

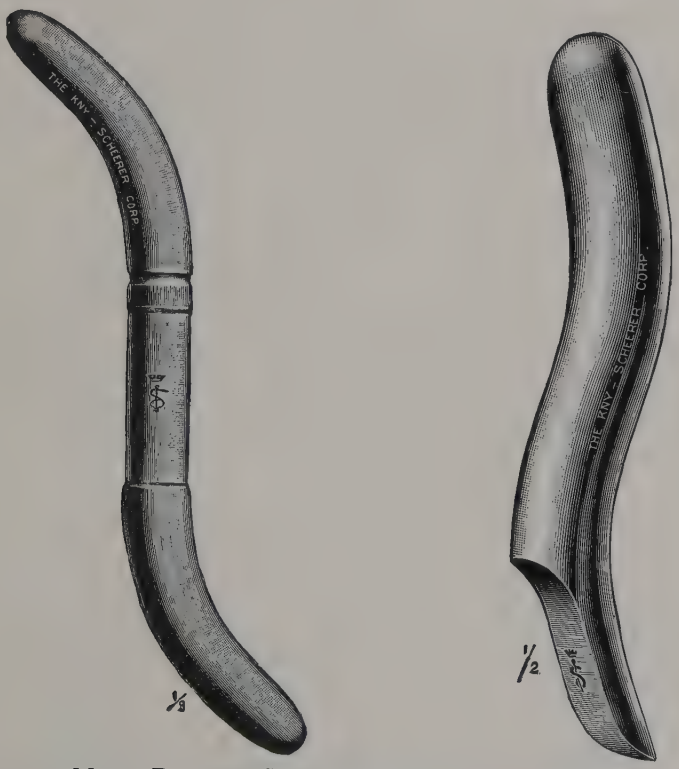


FIG. 121.—URETERINE METAL DILATORS, SINGLE AND DOUBLE. They are numbered according to size (Kny-Scheerer).

Sims speculum or weighted speculum, and the anterior lip of the cervix grasped with a stout volsellum. The inside of the cervix is painted with tincture of iodin or a 5 per cent picric acid solution on a thin cotton-wound applicator. The dilators are introduced in the order of their size. Lubrication with lysol solution or sterile oil or vaselin facilitates the introduction. As the uterus is being pulled down, the axis is becoming more or less straightened out. It is essential to push the dilator cautiously to the fundus without undue force. Two resistances will be felt, the first at the internal os which is overcome by cautious and patient pressure; the second at the fundus which shows us how far the following dilators and the curet may be introduced. Make a mental note of the length of the uterine canal. Never push an instru-

ment beyond this distance! The resistance at the internal os is felt in the majority of instances only when bigger sizes are being used. Undue force at this step is a gross mistake. Under no circumstances should the dilator pass the constriction at the internal os with a jerk. This detailed instruction is justified in view of the numerous cases in which the fundus has been perforated by a dilator or curet. Permit each dilator to remain in place a short while, have it quickly pulled out by an assistant and immediately insert the next dilator. The occurrence of a tear in the cervical wall is recognized from the bleeding and by the ease with which the instrument slips through the internal os. In such a case, further instrumenta-

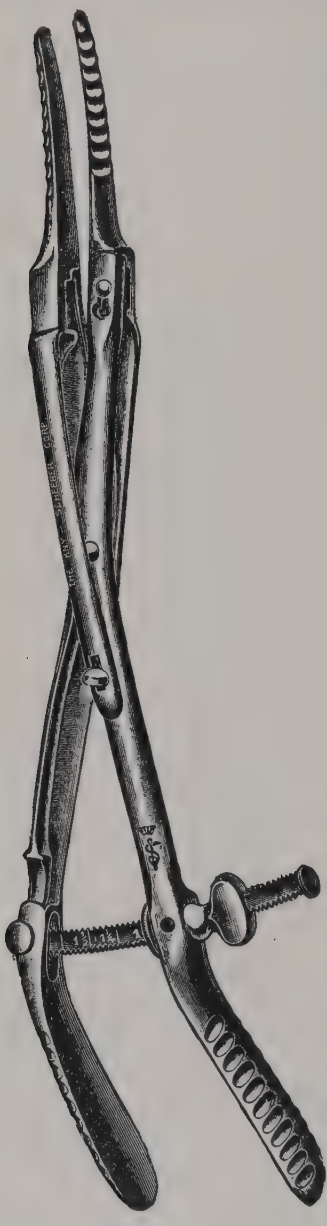


FIG. 122.—GOODELL'S DILATOR (Kny-Scheerer).

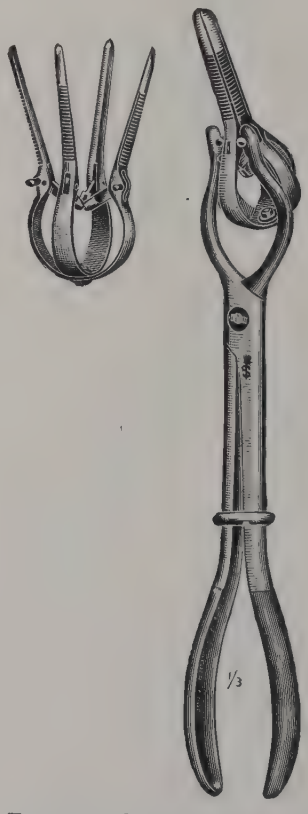


FIG. 123.—HIRST'S METRANOIKTER (Kny-Scheerer).

tion should be desisted from. An iodoform gauze strip is placed in the cervical canal and the patient is returned to bed.

I am in the habit of using the dilators up to number eight and then finishing the dilatation with a Goodell dilator (Fig. 122) the branches of

which are *very slowly* spread apart until the desired degree of dilatation is obtained. The "metranoikter" of Schatz or Hirst (Fig. 123) has four branches which produce a more uniform dilatation of the internal os. Both instruments must be used with caution to avoid tears.

Rapid dilatation is the method of choice where curettage is to be performed.

2. Laminaria or sea tangle tents are short solid cones made from the compressed stalks of a seaweed—laminaria digitata. They absorb moisture and expand, thereby dilating slowly the cervical canal (Fig. 124). The

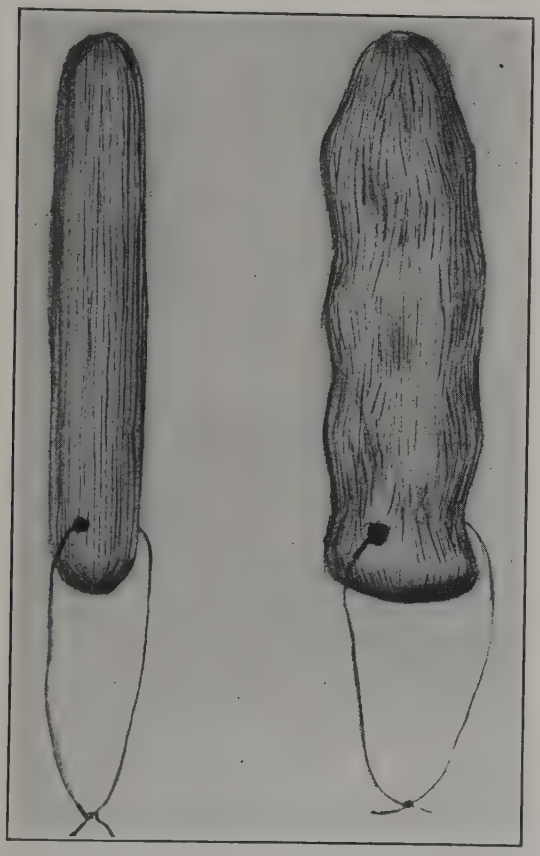


FIG. 124.—LAMINARIA (SEA TANGLE) TENT, LARGE SIZE, BEFORE AND AFTER DILATATION.

danger of infection which was rather common in former years has prejudiced many American writers against this form of dilatation. Properly prepared, however, these tents enable us to dilate the cervix in the most gentle fashion and without a narcosis. I put the tents in pure carbolic acid for twenty-four hours and transfer them into 95 per cent alcohol for the same length of time after which they are ready for use.

The preparation of the patient and the physician is the same as for rapid dilatation. The width of the internal os is ascertained by a metal dilator and a somewhat thinner tent is selected which immediately before introduction

is thrown into boiling water for a few seconds. It then becomes soft enough to be bent according to the direction of the uterine cavity as previously determined by bimanual palpation. Dipping the tip in sterile oil renders the tent slippery which by means of a dressing forceps is pushed into the cervix. When the cervical canal is fairly wide, as in multiparous women, two thin tents are better than one very big tent. The upper end extends a little beyond the internal os, the lower end protrudes a trifle from the external os. The introduction must be made gently and any abrasion of the cervical mucosa must be avoided; there should be no bleeding in this procedure. The tent is kept in place by gauze packed into the vagina. The upper end of the gauze should be passed through the loop of silk at the end of the tent to prevent the latter from slipping into the uterus. The instruments are now removed and the patient is brought to bed. Pain produced by laborlike contractions of the uterus calls for hot moist compresses on the abdomen, a codein suppository or a subcutaneous injection of morphin. Occasional vomiting is of no consequence so long as temperature and pulse which are measured every four hours are normal. After twenty-four hours, gauze and tent are removed through a speculum. At times the tent is constricted by the internal os and requires forcible extraction with a dressing forceps; this may occasion considerable pain and at times some bleeding. This unpleasant complication is avoided by selecting thin tents which can be passed through the internal os without force. Insufficient dilatation necessitates a repetition of the procedure and the same antiseptic precautions, this time with two or more thin tents. The uterus should first be wiped out with an antiseptic solution (tincture of iodin, picric acid). *Fever necessitates immediate removal of the tent no matter how short a time it has been applied.* We have to deal in such a case either with an infection produced by the tent itself or an exacerbation of a preëxisting but latent inflammation. *Laminaria tents must never be introduced in the office.*

After twenty-four, at the most after twenty-eight, hours, dilatation is sufficient for any intra-uterine manipulation. When it is employed in obstructive dysmenorrhea, the good effect lasts very much longer than after the rapid method.

Occasionally, a combination of both methods is useful. After twenty-four hours of laminaria dilatation, the cervix is usually softened to such an extent that the larger sizes of metal dilators can be introduced without difficulty.

3. Packing of the uterus and cervix with gauze, by the method described in Chapter XIV, is advantageous in cases of incomplete abortion or retention of placental tissue. The dilatation obtained after twenty-four hours is usually sufficient to introduce large curets or even the finger. After any dilatation, irrespective of the specific method employed, the interior of the uterus must be thoroughly cleansed, either with applicators or an intra-uterine douche. For the latter, the Fritsch-Bozeman recurrent catheter seems to me superior to other models (Fig. 125). Two quarts of hot normal saline or ¼ to ½ per cent lysol solution are injected *under very low pressure.* I rarely resort to intra-uterine douching except when the uterus has been dilated and curetted after abortion or labor.

Curettage.[1]—*Far too much curetting is being done every day!* It has been the Alpha and Omega of the old-time gynecologist. This simplest of all

FIG. 125.—FRITSCH-BOZEMAN INTRA-UTERINE CATHETER (Kny-Scheerer).

FIG. 126.—MUNDE'S LOOP CURET (Kny-Scheerer).

gynecologic operations may yet have disastrous consequences if the indications and technic are not observed.

[1] The frequently used word "curettement" is, according to Pozzi, "a stupid and barbarous term, like many others which have been borrowed from the French."

Curettage is indicated:

1. Where there is the slightest suspicion of cancer in the uterine cavity. Thus the discharge of pure blood or blood-stained secretion in a post-menopausal woman imperatively calls for the use of the curet. In such a case, curettage is an exploratory or diagnostic procedure. As, however, malignancy may occur before the menopause, any suspicious deviation from the normal menstrual flow may justify a diagnostic curettage after all the features of the case have properly been taken into consideration.

2. Where there is abnormal uterine bleeding which is not explained by some definite condition, local or general, and which is not checked by other means of treatment. In such a case, curettage is a therapeutic procedure. This refers more particularly to mucous polyps and to the cases of so-called chronic endometritis, better called subinvolution, in which the endometrium is thickened.

3. Where products of conception are retained in the uterus after abortion or parturition. Here, too, curettage is a method of treatment.

4. As a preliminary to operations for prolapse or retro-displacement provided menorrhagias or leukorrheal discharges suggest congestion and thickening of the uterine mucosa. The final benefit from any such operation will be achieved more quickly and completely if no unhealthy endometrium is left behind.

Curettage is strictly contra-indicated:

1. In the presence of any acute or subacute inflammation of the adnexa because the traction on the uterus and reflex contractions may tear fresh adhesions and even open encapsulated abscesses (danger of peritonitis).

2. In recent miscarriages after the third month (danger of perforation).

3. Where there is any possibility of pregnancy.

Curettage cannot do any good:

1. In the ordinary "leukorrhea."

2. In congestive dysmenorrhea. Premenstrual and menstrual dull aching pain is not relieved by curetting.

3. In menorrhagia of general and not of local origin.

4. In sterility, primary or secondary, due to old pelvic infection.

5. In amenorrhea.

6. In fibroids or other new growths.

Technic of Curettage.—The uterus is scraped out with "curets" of which there are many varieties. The loop curet answers the purpose best (Fig. 126). It should be fairly sharp and rounded on top. The shank must be slightly flexible so as to give the instrument the curve required by the axis of the uterus. Frequent boiling renders the shank too soft; it should then be retempered or replaced by a new curet. Hooked curets, hollow flushing curets, or sharp spoons are of no advantage. Dull curets are altogether useless. Various sizes of loop curets must be on hand.

The patient is prepared as for any major vaginal operation. She is placed in lithotomy position and a bimanual examination is made. The vagina is separated by retractors, and the cervix is pulled down by a volsellum in the anterior lip. The length of the uterine canal is measured by the graduated

uterine sound. Occasionally a small curet may be introduced through an undilated cervix. Ordinarily, however, dilatation must precede curettage. The size of the curet corresponds to the degree of dilatation. It is a fundamental mistake to push the curet forcibly through an insufficiently dilated cervix.

The curet is held between thumb and index finger like a pen and slowly and very gently inserted until it is arrested by the resistance at the fundus (Fig. 127). It is then pulled downward upon the uterine wall energetically and strongly until the internal os is reached. The strokes are made systematically first on the anterior wall; then, placing each stroke close to, or over-

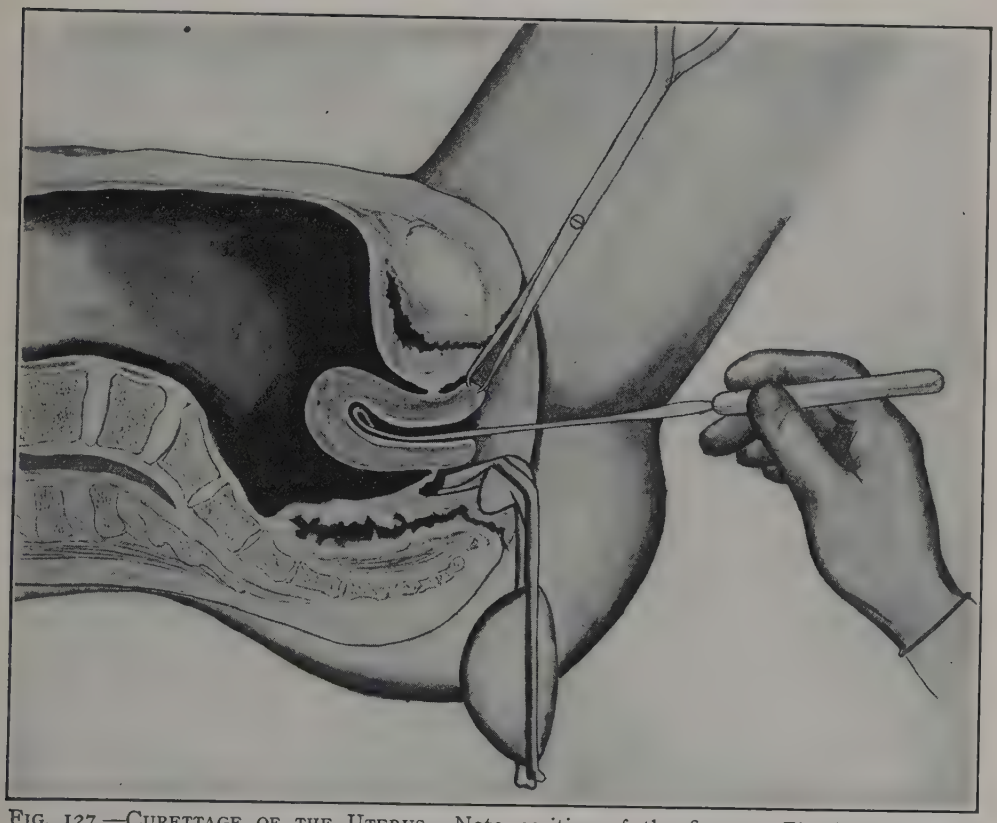


FIG. 127.—CURETTAGE OF THE UTERUS. Note position of the fingers. The instrument is introduced to the fundus without any force and pressure is exerted only on pulling the loop blade toward the internal os.

lapping, the preceding one, the curet is moved to the posterior and back to the anterior wall. Particular attention is given to the tubal corners because here is the favorite seat of polyps, cancers, and chorio-epitheliomata. A smaller curet must be used for this location.

The action of the curet is controlled by the senses of touch and of hearing. The scraping is completed when no more soft tissue is felt and the grating sound of the instrument on the resisting muscle is heard.

The scrapings are pushed into the vagina during or after the procedure, wiped out with sterile sponges and washed in cool normal saline solution. After the curettage they are transferred into 75 per cent alcohol or 10 per

cent formalin solution. The bottle must be plainly labeled at once and forwarded to the nearest laboratory for microscopic examination.

A very practical procedure has been suggested by O. Schwarz in order to avoid the admixture of clotted blood in the scrapings which is a disturbing factor in microscopic examination. A pint of sterile 4 per cent sodium citrate in normal salt solution is divided equally in two small sterile basins on the instrument table. Before scraping, the uterine cavity is swabbed out with this solution and a small amount is poured into the vagina, filling the posterior fornix. As the scrapings come out of the external os they fall into the citrate solution which from time to time is emptied through the grooved, weighted speculum in the basin of citrate solution below it and then replenished from the clean basin on the table. After the curettage the contents of the basin are strained through gauze and only the clean-cut pieces of endometrium remain behind. These are rapidly rinsed in a cold normal saline solution and transferred to the specimen bottle.

In the majority of cases, curettage requires some form of anesthesia, usually a short ether or gas narcosis. Frequently "twilight sleep" with two injections of hyoscin hydrobromid, 0.0045 (gr. 1/150), two and one hours, respectively, before the operation, the first of these combined with morphin, 0.01 (gr. 1/6), is all that is needed. Here is also a field for local anesthesia, either alone or combined with "twilight sleep." Local anesthesia is produced with a ½ per cent novocaine solution to which adrenalin, four drops to one ounce, is added. The drug, combined with suprarenin, is also put up in tablets. A strong metal syringe with fine hypodermic needles, of the kind used in dental work, is required. Both the solution and syringe are sterilized by boiling. The entire length of the needle is thrust into the substance of the cervix at the four points of the compass; or small quantities of the solution are injected, according to Hertzler's method, around the periphery of the cervix and into the broad ligaments, blocking the nerves before or at their entrance into the cervix proper.

The blanching of the cervix due to the action of the adrenalin which occurs within two or three minutes indicates that analgesia is complete. The ease with which the cervix yields to dilatation is often surprising. Where a general anesthesia is undesirable for any reason, local analgesia will be found very useful.

After the curettage the uterus is wiped out first with dry gauze, then with a strip dipped in tincture of iodin or 5 per cent picric acid. If there is much bleeding, the uterus is firmly packed for twenty-four hours. The patient remains in bed for three days. In benign conditions, intra-uterine treatment may be begun a week later to prevent recurrence of hyperplasia.

Dangers of Curettage:

1. Infection.—Infection can be avoided by careful asepsis and antisepsis. *Curettage should never be performed in the office.* Adnexal disease is apt to flare up again after curettage, as mentioned before. In gonorrhea of the uterus the curet is altogether out of place.

2. Perforation.—Perforation may be due to the following causes:

(*a*) The position of the uterus and the direction of the canal have not

been ascertained by bimanual examination or introduction of the uterine sound.

(*b*) The curet has been pushed with undue force through an insufficiently dilated cervix.

(*c*) The curet has been pushed to the fundus without caution and gentleness.

(*d*) The curet itself was too small or pointed.

(*e*) The uterine wall was abnormally soft, as for instance after abortions or in the puerperium, at times in cancer, or in generally debilitated patients (pulmonary tuberculosis). *This complication can be prevented by injecting 1 c.c. of pituitrin or a similar preparation into the deltoid or gluteal muscle before the curettage and by using very large curets.* It is perfectly true that even the most famous representatives of our specialty have met with this accident, but it is equally certain that the fault was theirs in almost every case. "Even the worthy Homer sometimes nods."

The life of the patient depends on the prompt recognition of a perforation. The diagnosis is made if the instrument (sound, dilator, or curet) penetrates abnormally far into the uterus. Other explanations to the contrary notwithstanding, this almost always means perforation. A *single* perforation into the peritoneal cavity need not lead to peritonitis or intra-abdominal hemorrhage if *any further manipulation is immediately discontinued.* The opening is, as a rule, so small that it is closed by the contraction of the uterine muscle. The patient is put to bed at once; a heavy ice-bag on the abdomen and a teaspoonful of paregoric every two or three hours keep the intestines quiet; hot coffee or an injection of camphorated oil combat any signs of peritoneal shock. Unfortunately, this favorable outcome is often frustrated by the carelessness of the physician who fails to recognize the seriousness of the condition, persists in his operation and perhaps produces additional perforations.

FIG. 128.—BUMM'S EXTRA LARGE CURET IS OF ADVANTAGE IN CLEANING OUT THE UTERUS AFTER ABORTION. Its size prevents perforation if the precautions described in the text are observed.

3. Amenorrhea.—Amenorrhea may be caused by too excessive curetting, chiefly after abortion or labor, and employing strong caustics. The result is a partial or total atresia of the uterine cavity.

4. Failure to Stop the Bleeding Due to Imperfect Technic.—This applies more particularly to polyps in the tubal corners which cannot be eradicated unless a very small and rather curved curet is used, and to retained products of gestation if the practitioner uses a dull curet exclusively. I repeat that it may be impossible to feel or to remove retained placental tissue with a dull spoon or loop curet even if great force is used. In the last named variety of cases I employ an extra large, sharp

curet (Fig. 128) after a preliminary injection of pituitrin has been given.

Exploratory Excision.—The question whether a lesion of the cervix is benign or malignant can often be decided only by microscopic examination. For this purpose a wedge-shaped piece must be excised in such a fashion that, if possible, about half of it is healthy tissue, because it is frequently the comparison between normal and abnormal tissue in the micro-

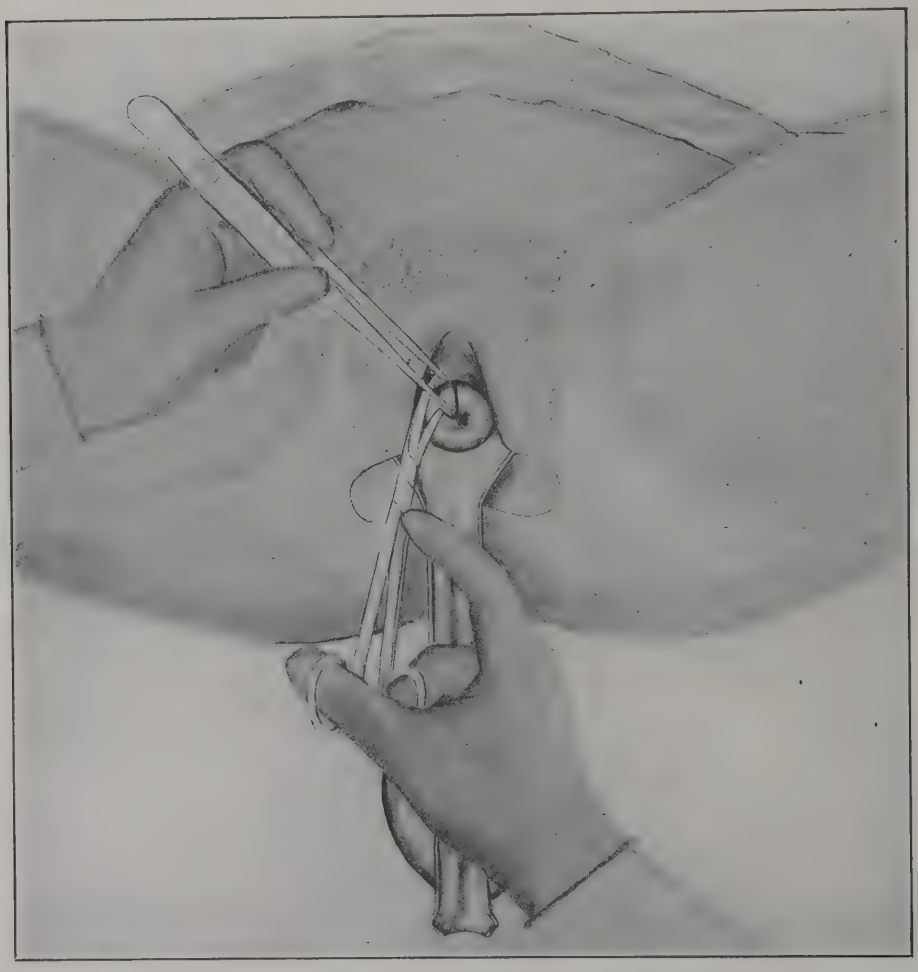


FIG. 129.—TECHNIC OF EXPLORATORY EXCISION.

scopic picture which is essential for the diagnosis. For this reason I cannot recommend specially designed "specimen scissors" which clip out only very small pieces of tissue. In performing excision (Fig. 129), a marked difference in consistence between the two kinds of tissue may be noticeable; pronounced softness of the suspicious part would be suggestive of malignancy. Excessive bleeding also points to cancer.

The little procedure requires careful asepsis and antisepsis and is best performed in local anesthesia (see above). The small wound is closed with

one or two catgut sutures if the bleeding is abundant; otherwise, firm tamponade with iodoform or xeroform gauze is sufficient. Where there is any suspicion of malignancy, it is better to cauterize the wound at once with a soldering iron or the Paquelin cautery and then to tamponade the vagina.

The Intra-uterine Stem.—The observation that the benefit derived from dilatation for the relief of obstructive dysmenorrhea was of but short duration in the majority of cases, led to the employment of intra-uterine stem pessaries which were left in the uterus for many weeks or months. The results obtained justified the expectations, and statistics covering many hundreds of cases were published showing that, in a large percentage, lasting freedom from menstrual pain had been accomplished. Incidentally it was noted that a goodly number of theretofore sterile women conceived after this treatment. Finally, a stimulating effect on the uterus and a correction of amenorrhea or oligomenorrhea from infantilism or superinvolution after childbirth was observed, with subsequent development of the hypoplastic organ.

These gratifying results, however, were counterbalanced by an increasing number of reports of more or less serious pelvic infections resulting from this procedure, and quite a few deaths have been recorded even in the most recent literature. Under these circumstances it is not surprising that the method has not been generally adopted by gynecologists.

Dickinson and Smith, whose paper gives an admirable exposition of the entire question, formulate the following list of indications:

The functions of the intra-uterine stem are:

1. The development of the infantile uterus or ovaries or both.
2. The redevelopment of the uterus and ovaries of premature menopause, obesity, etc.
3. The development of the congenitally defective muscle in the uterine wall at the flexing angle.
4. The straightening of the angle of extreme flexion.
5. The widening and enlargement of the narrowed internal os, giving better drainage.
6. The enlargement of the external os.
7. The relief of amenorrhea due to chronic sclerosis—premature menopause—obesity, etc.
8. The empirical relief of dysmenorrhea. (Notice that several of these indications overlap.)
9. The cure of sterility—in cases in which the vaginal secretions are normal in reaction, in which gonorrheal infection and all pelvic inflammation has been excluded and the husband's semen contains abundant, active spermatozoa of normal size and shape.

The *contra-indications* center largely around the question of any acute or chronic inflammation anywhere in the pelvic cavity. The very greatest caution is necessary to exclude any such condition before introducing a stem lest a latent infection be stirred up with serious consequences to follow. In sterility cases the stem is contra-indicated unless the husband has an absolutely clean bill of health.

Four main objections may be raised against the use of stems:

1. The Shape.—Most stems have a base which extends into the vagina. This represents a bridge by which infection may travel from the vagina into the uterus.

2. The Size.—The stem should not be so long as to touch and bruise the fundus. Neither should it be so narrow as to bury itself in, and cut, the uterine wall. This refers particularly to the spring steel devices which hold themselves in place by spreading apart when released in the uterine cavity.

3. The Surface.—Gutters, slots, or any other opening retain clotted blood and dried mucous secretion rather than facilitate drainage.

4. The Material.—Hard rubber stems will produce foul discharge if left in place for weeks.

These objections are overcome by the solid Baldwin stem of polished

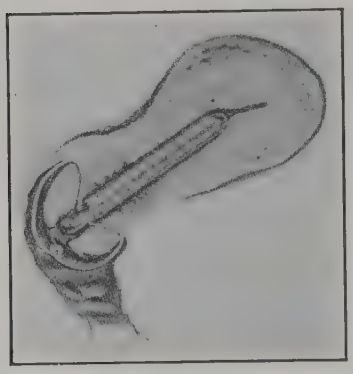


FIG. 130.

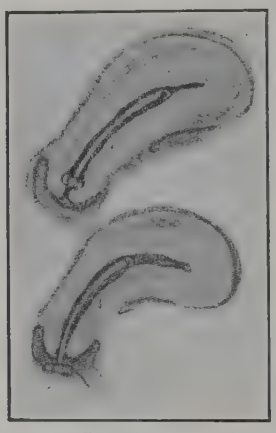


FIG. 131.

FIG. 130.—BALDWIN'S SOLID GLASS STEM PROPERLY PLACED WITHIN THE EXTERNAL OS AND MEASURED TO BE ABOUT HALF AN INCH SHORTER THAN THE UTERINE CANAL. The stitch is placed as high as possible within the cervix (from R. L. Dickinson, *Am. Jour. Obst.* 1913, 68:698).

FIG. 131.—DICKINSON'S SILVER STEM HIDDEN WITHIN THE UTERUS. It is usually retained by its conical taper above the internal os. Occasionally it slips downward as far as the posterior vaginal wall and rests upon it. The dilating effected still continues at the internal os *I* (from R. L. Dickinson, *Am. Jour. Obst.* 1913, 68:692).

glass (Fig. 130) and the hollow Dickinson stem of pure silver (Fig. 131). Both these devices remain entirely within the cervical canal.

Dickinson gives the following description of the technic of introduction:

The patient is prepared as for any vaginal operation. Vagina and cervix are thoroughly cleansed. The uterine canal is measured and a Baldwin glass stem, slightly shorter than the canal, is selected after it has been tested to see whether it is cracked. The cervix is pulled down and the uterus dilated. A cervix needle threaded with a stout silver wire or thick silkworm suture is passed through the posterior lip of the cervix at the cervicovaginal junction or even higher. The stem is now threaded and pushed into the cervix one-fourth inch or more deeper than needed. Finally, the suture is passed through the anterior lip of the cervix and tied or fastened with split shot. By placing the stitch exactly in the middle line, the area of the minimum blood supply is selected.

The hollow silver stem, according to Dickinson, may be introduced in the office. All instruments are sterilized. With the patient in Sims' posture, the nurse holding the Sims speculum (or, in the absence of an attendant, in the knee-chest posture with the bivalve speculum), the tenaculum is hooked into the anterior lip of the cervix, and 4 per cent novocain, or adrenalin 1:1000, is applied to the internal os by hypodermic injection or with a long glass pipet. Cervix and vagina are swabbed with pure peroxid or with tincture of iodin. The uterine sound is passed to ascertain the length and direction of the canal, a thin, branched dilator of the glove-stretching variety is then introduced, and the external and internal os are dilated. A stem is selected which is one-fourth inch shorter than the uterine canal and small enough to slip by the internal os. The cervical end of the stem is grasped with a dressing forceps and the stem is inserted in the canal, the curve of the stem corresponding to the curve of the canal. The stem lies entirely within the cervix and remains in place, owing to the knob at the outer end which prevents it from slipping out.

As the success of the method rests primarily on the proper selection of cases, the procedure is best left in the hands of the specialist.

LITERATURE

Dickinson and Smith. Amer. Journ. Obst., 1913, 68:686.
Fothergill. In Fairbairn's Obstetrics and Gynaecology, London, 1921, 822.
Gellhorn. Journ. Am. Med. Assoc., 1913, 61: 1354.
Kerr. Clinical and Operative Gynaecology, London, 1923, 634.
Pozzi. Gynaecology, Engl. Transl., New York, 1894.
Schwarz and Kohlbry. Journ. Missouri State Med. Assoc., 1919, 16: 209.
Stoeckel. In Therapeutische Technik by Schwalbe, 5th ed., Leipzig, 1921.

CHAPTER XVII

HYDROTHERAPY

The external use of water for therapeutic purposes is a valuable adjunct in the treatment of certain gynecologic diseases. Hydrotherapeutic procedures include full and partial baths, moist compresses, vaginal douches, etc. Of these, vaginal douches are quite commonly and rather promiscuously prescribed while most of the other hydriatic measures are resorted to comparatively seldom. It seems to many to be beneath the dignity of an M.D. to become familiar with the technical and therapeutic possibilities of hydrotherapy, and when, for example, baths are prescribed, they are, as a rule, left to nurses who are but indifferently trained and know little or nothing about the physiological effects of water, or to bathhouse attendants. Where, then, no such attendants or nurses are available, that is, in private homes or in rural districts, the practitioner may find himself in a quandary as to explicit instructions to family members who are to carry out his orders.

It, therefore, becomes necessary to give in this chapter a somewhat detailed description of the technic of the various procedures, to point out the advantages gained therefrom, to set forth their respective indications, and to mention some of the precautions which have to be observed. The complicated and expensive apparatus that form the equipment of modern sanatoria will be left out of consideration and only those measures will be discussed which have a direct bearing on our subject and which the practitioner can apply in any home or employ with the facilities in the average hospital.

Cold Tub Bath.—The temperature of the water is about that of the room, around 75° F. Except in the summer, it is a good plan to fill the tub the night before. The duration of the bath is from one-half to one minute and may gradually be lengthened to three minutes. Very sensitive patients may wash face, neck, and chest with cold water immediately before the bath. Congestion of the brain can be prevented by a cold compress to the head. While in the water, the patient moves around or rubs her body vigorously. She leaves the bath while the skin is still red; cyanosis of the skin, extreme shivering, headache, and vertigo must be avoided. After the bath, the patient dries herself, or is rubbed down, with a coarse towel, takes some calisthenic exercises, dresses quickly in the bathroom, which should be warm, and after a hot breakfast is ready to take a brisk walk, unless, of course, her general condition requires rest in bed.

The primary effect of cold water, if applied to the entire surface of the body, is depressing. The small superficial blood-vessels contract and the blood is driven to the interior of the body and causes dilatation of the large internal vessels. There is first a quickening, then a slowing of the pulse with increase of tension, and an increased number of red cells enter the circulating

blood. The respiration is first checked, then quickened, and often gasping. Muscular contraction is increased, and the nervous system is profoundly affected by the stimulation of the nerve endings in the skin.

This action of the cold is usually followed by a "reaction," that is to say, a reflex response of the central nervous system which brings forth phenomena exactly opposite to those produced by the action of cold. The small superficial vessels now dilate and the large internal ones contract so that an extra amount of blood comes to the surface of the body, and blood-pressure is increased. The skin becomes warm, but the body temperature is somewhat lowered because the greater amount of blood in the skin allows of a greater loss of heat by radiation. The pulse becomes slow, the respiration freer, slower, and deeper, and perspiration may be increased.

It is this reaction which we wish to call forth because of its powerful effects upon the circulatory, respiratory, and secretory apparatus and the muscular and nervous systems, whereby stored-up products of metabolism and disease are eliminated, excess of adipose tissue is absorbed, swollen glands are reduced in size, the circulation is intensified, the musculature better nourished, and last, but not least, the nervous system is strengthened.

A person who "reacts" promptly upon a cold bath feels better, appears stimulated and has a rosy complexion. Therefore, if such normal response is lacking, if the pulse is weak, the color of the skin pale or cyanotic, and the patient feels exhausted, as, for instance, in anemic or debilitated people whose skin is not well supplied with blood, we must try to bring about a healthy reaction. We can do this by warming the skin beforehand—by hot water bags or dry heat in bed or by a hot bath just before the cold one. A cup of hot tea taken in bed, fifteen minutes before the bath, is valuable; also energetic friction of the skin before, during, and after the cold bath, and a hot drink while dressing.

The appearance of a healthy reaction is further favored by the mechanical (pressure) stimulation of a strong cold shower, given during or at the end of the cold bath, or by chemicals added to the cold water which stimulate the cutaneous nerve endings. Of the latter, only two or three of the most valuable procedures need be described.

Carbonic acid gas bath, better known as the Nauheim bath, is an artificial reproduction of the baths in the famous watering place of Nauheim, in Germany. The materials for this bath can be bought, but where they are not obtainable 1,400 grams (about 3 pounds) of potassium bisulphate, a handful of table salt, and three tablespoonfuls of chlorid of calcium are deposited in the tub, the temperature of which should be between 80° and 90° F. The patient enters the bath and remains perfectly quiet. One thousand grams (2 pounds) of bicarbonate of soda are now distributed evenly throughout the water. The development of the carbonic acid gas, which is set free by the solution of the salts, continues for about twenty minutes. The entire body is covered with myriads of small gas bubbles; the skin is reddened, and a pleasant sensation of warmth is felt, because the gas causes a marked dilatation of the superficial vessels. The duration of the bath is from three to five minutes the first day, one or two minutes more the next

day, and so on until the maximum time of from twenty to twenty-five minutes is reached. Simultaneously, the temperature of the water is very gradually reduced to 70° F. or even less. The escaping gas, being heavier than air, covers the water in a layer and occasionally causes headache, if the bathroom is poorly ventilated and overheated. By covering the tub with a sheet or blowing the gas away from time to time this slight disadvantage can easily be corrected. After the bath the patient is enveloped in a hot sheet and given friction over the sheet until all moisture is absorbed. She must not be allowed to exert herself in the least and should rest quietly for an hour or two.

Mustard or turpentine baths are simple and cheap substitutes for the Nauheim bath.

Half a pound of mustard powder is mixed to a paste with cold water and squeezed through a bag into the bath water. The mustard powder must not be put loose into the bath water, for it will not mix properly.

Half a pound of turpentine emulsion (Ol terebinth., 1 part; aqu. ammoniae, 2 parts) are added to the full bath.

The temperature and duration of these baths are about those of an ordinary cold water bath.

Salt Baths.—Dissolve ten to fifteen pounds of sea salt in a tub half full of hot water; allow the water to cool down to about 70° F. Rub the patient while in the tub. Dry her by rubbing briskly over a warmed sheet.

All these cold and stimulating baths should be given in the morning, preferably before breakfast; but if for any reason they are taken at other times of the day, one should wait two or three hours after a meal. Their principal value, so far as our special interests are concerned, lies in the treatment of the various forms of nervousness. In fact, hydriatic measures form an integral part of the therapy of neurasthenia, together with forced feeding, rest in bed, or, in later stages of the treatment, in outdoor life, active and passive exercises, psychotherapy, etc. It would be a mistake, however, to assume that the simple direction to take this or that form of cold bath is sufficient. Strictest individualization is an absolute necessity. One can never foretell just how a neurasthenic will respond to any form of treatment. The physician should supervise at least the first treatment, not only to see that directions are carried out properly, but to observe the degree of reaction, for then only can he decide whether his method will benefit the patient. Fortunately hydrotherapeutic measures permit of many modifications, both as to intensity, duration, and combinations, some of which will be discussed later; and the principle, which has repeatedly been enunciated in these pages, that we have to consider the sick *organism*, not merely a diseased *organ* or a specific method of treatment, should ever have our full attention.

In anemic or chlorotic individuals who are quickly exhausted and complain of headache, a short, cool sponge bath of the whole body is given in the morning immediately after rising. Without drying, a large bath towel or a sheet is put around the body, leaving, however, head, neck, and arms free; a woolen blanket covers the sheet. The patient remains in bed for from ten to twenty minutes until she feels warm all over, and then rubs herself dry. Following this an alcohol rub adds to her well-being.

A second indication for cold baths is obesity. We have seen in Chapter XIII that there are two forms of adiposity which have an entirely different etiology. Whatever the cause may be, hydrotherapy is of great value in conjunction with the other therapeutic procedures that may be required in the individual case. Cold baths cause direct absorption of fat. The loss, however, is insignificant. The main virtue of the bath is that the patient feels refreshed and is willing to undertake the outdoor or indoor exercises which are so important a part of the régime. Then, too, the baths are of value in the care of the skin. Obese people perspire easily and excessively and, in addition to the discomfort therefrom, they are prone to eczemas. Frequently the cardiac symptoms of fat persons are ameliorated by hydriatic measures, but caution and supervision are imperative.

Finally, the "hot flushes" of the menopause may at times be benefited by a cautious trial with cool baths; better still, in some cases, are cool sponge baths.

Natural Cold Baths.—Open-air baths are of immense value, both for hygienic and therapeutic purposes, the latter chiefly in the treatment of constipation and neurasthenia. Swimming, which is nothing but gymnastics in the water, is one of the very healthiest physical exercises and should be taught to girls wherever there is a chance. Young people, as a rule, stay in the water too long. Particularly where the water is in constant motion (strong current, surf) the continuous loss of body temperature may become too great.

Anemic, poorly nourished, and nervous women should not be sent to the more northerly seashore as a cure for their neurasthenia. The constant motion of the air, the sound of the waves, and bathing in the surf are not conducive to relaxation and building up of physical strength.

There are nowadays municipal and private pools in many cities, but unfortunately their disadvantages as possible sources of infection frequently overbalance their advantages.

Cold Baths During Menstruation.—The popular belief among laity and physicians of the harmfulness of bathing during menstruation has come down to us from gray antiquity. The average woman of to-day thinks, just as the Hebrew woman of Biblical times did and her savage sister in the Marquesas Islands still does, that the uterine bleeding periodically purges her of uncleanness which is poisonous to her and others. Hence, she cannot at this time mingle with other women in the community bathhouse which still exists in various parts of the world. The advent of the individual bathroom has not dispelled the old inhibitions. Of course, it is not so very long that medical science has brushed away the myth of the uncleanness of the menstrual blood, and it will take ten more years to make this knowledge the common property of the profession, and twice or thrice that time to impart the correct conception to women at large. The process of enlightenment should be hastened and therefore let it be asserted positively and emphatically that menstruation in itself does not contra-indicate bathing. On the contrary, the increased activity of the glands of the skin at this time and the decomposition of the excreted blood makes bathing a hygienic necessity.

Whether or not to advise a *cold* bath depends on various factors.

1. Is the girl or woman in the habit of taking cold baths? If so, she may continue during the menses. McMonagle, in the discussion on Edgar's paper, mentioned that the natives of Honolulu go into the surf every day throughout the year and that in San Francisco where the water is much colder than either in Honolulu or in the Atlantic Ocean, he knew of many healthy women who would bathe in that water through the menstrual period. Houzel, a French author, found in fisherwomen that the wading in ice-water was often accompanied by normal and painless menstruation, provided the women were accustomed to it, and he asserted that sea baths among these people could be taken from puberty to the menopause without ill effects.

If one wants to be very cautious, the cold bath may be forbidden on the first two days of the flow, when tepid baths may be taken instead, but permitted again towards the end of the period.

To the woman who is not accustomed to cold baths, a tepid bath of about 90° F. is more advisable, for it is a fact that a cold bath may at times produce suppression of the menses, just as very hot baths are apt to cause a prolonged and profuse flow.

2. The condition of the genital organs must be taken into consideration, as well as the effect the menstruation has on the organism and the genital organs. A patient with dysmenorrhea, for instance, or one who is greatly exhausted by menstruation, should not take a cold bath during the period. In gynecological diseases, as a general rule, cold bathing had better be interrupted during menstruation, while warm baths seem to have sometimes a favorable effect, for example, in chronic inflammations.

3. On the other hand, if there is a special and urgent indication for a cold bath, as in typhoid fever, the question of menstruation may be left out of consideration.

4. In scanty menstruation, a cool carbolic acid bath may be of direct advantage, as it increases the physiologic afflux of blood to the genitals. (Kisch.)

5. The final factor is the actual experience: if cold bathing during menstruation has unfavorable effects in an individual case, it must not be repeated, and vice versa.

Whatever objections, traditional or real, there may be against cold baths, there are none against tepid showers or tubs, and I heartily subscribe to Edgar's contention "that the woman of ordinary strength and health is able to bathe during menstruation not only without any injury, but with marked addition to her personal comfort and benefit to her general health."

In this connection, a word regarding *cold bathing in pregnancy* may not be out of order. Theoretically, the congestion of the large internal vessels following the chilling of the surface and the contraction of the superficial vessels may lead to a disturbance of gestation and points to great caution. On the other hand, I know of many instances where women have taken cold tubs, or have bathed in fresh water or the ocean in ignorance of their condition and without harm. The question is still open, though the majority of writers warn against cold baths during pregnancy. Even more inadvisable is

the other extreme, and very hot tub baths or partial procedures such as foot or sitz baths are contra-indicated.

After this digression, we return to our subject.

The Sitz Bath.—The patient is clothed in an undershirt, stockings and slippers. The bath is given in a specially shaped tub (Fig. 132), which allows the patient, while sitting in it, to place her feet on the floor with only the upper part of the thighs and the trunk to the waist line immersed in water. The undershirt is turned up as far as necessary and a large blanket is fastened

FIG. 132.—SITZ BATH.

at the neck and envelops both bath and patient. An ordinary wooden wash tub will take the place of a sitz bath tub. It should be raised on a low, wooden box, because otherwise the position of the patient is cramped and uncomfortable. A blanket in the bottom, a folded bath towel to pad the edge and ease the knees, and a chair on the wall as a back rest will materially add to the patient's comfort. At a temperature of 50° F. the duration is from three to five minutes, at 70° F. the patient remains in the bath from ten to twenty minutes. A cold cloth on the head prevents congestion. While in the water, the patient massages her abdomen and back gently with a rough bath mitten. The bed has been covered with a blanket, over this a sheet, both warmed with

hot water bags. The patient rises, dries herself superficially and at once goes to bed, where the sheet absorbs the rest of the moisture. The sheet is then removed, the blanket a little later. Three such sitz baths a week are sufficient in the beginning; later, if the patient responds well, one bath daily.

The effect of the sitz bath is antiphlogistic and sedative, and the procedure is chiefly indicated in acute inflammatory processes in the pelvis, particularly those with peritoneal irritation. It is further of value in the treatment of chronic puerperal subinvolution because it stimulates uterine contractions. For the same reason, it may be tried in certain cases of menorrhagia where malignancy or fibroids can be definitely excluded. Finally, where the pelvic floor and the uterine ligaments are relaxed and a prolapse is threatening, short cold sitz baths are apt to strengthen the lost tone of the various structures involved. Atonic constipation and weakness of the sphincter of the bladder are likewise benefited by the intense nerve stimulation in the abdominal and pelvic organs. Finally, in some forms of pruritus vulvae, cool sitz baths advantageously support the causal therapy (diabetes, cervical catarrh, etc.).

The Ice-Cap.—We make extensive use of the ice-cap in acute inflammatory conditions (pyosalpinx, fresh exudates) particularly when the peritoneum shows signs of irritation. Contrary to theoretical considerations, the local application of ice acts as an antiphlogistic. It relieves pain, and in intraperitoneal hemorrhage, for instance, in a ruptured tubal pregnancy, it keeps the bleeding within bounds until the life-saving operation can be performed. Moreover, in all the conditions mentioned it keeps the patient quiet, which is an essential part of the treatment.

Ice-caps of rubber or rubberized material with screw tops are obtainable everywhere. To fill an ice-cap, break the ice into pieces about the size of a walnut by means of a darning needle, which is hit lightly. In order to expel the air after filling the ice-cap, squeeze it above the ice before putting on the cover. Do not fill the cap more than three quarters its capacity and not even this much if it is to cover a painful part. *Always wipe the cap dry and wrap it in a thin towel before putting it upon the bare skin and change the towel from time to time as the ice-cap will "sweat" after a while; also expel the air as needed.* It is a good plan alternately to apply and to remove the ice-bag at intervals of half an hour. Where the ice is not well borne by the patient, it is unwise to persist in its use.

When an ice-cap cannot be procured, a fair substitute can be obtained by spreading upon a napkin a layer of linseed meal, 1 or 2 cm. thick, placing upon this a layer of cracked ice, covering this with a second layer of flour, and finally folding the rest of the napkin over the whole. Such an ice pillow will keep for two hours before the ice melts and wets the flour.

Hot water bags should never be used to serve for ice-caps.

Warm Baths.—Heat is used in gynecology more extensively than cold.

The *prolonged warm tub bath* about 90° to 100° F. is sedative. It is best taken at bedtime and should not be followed by vigorous rubbing or exercise. Its duration should be about thirty minutes. The effect in insomnia of neurasthenia is very gratifying.

The *hot tub bath,* followed by a *hot* pack is given in the following manner: The patient lies in water of 98° F.; by adding hot water, the temperature is gradually increased to 105° F. In this she remains five minutes and is then *without drying* wrapped in a sheet and woolen blankets, which leaves only head and neck free, until perspiration occurs. The face must frequently be bathed with cool water and the head covered with a moist cloth to prevent congestion. The pack is removed when the patient perspires, and the body dried and sponged off with warm alcohol. The procedure gives very good results in the restlessness and insomnia of neurasthenics, and, in combination with the various iron preparations, is an excellent mode of treatment for anemic and chlorotic patients.

Occasionally the hot pack causes congestion to the head and cardiac oppression. In such cases, the partial hot pack is preferable. The patient raises her arms, and only the lower two thirds of the body are wrapped in the pack, while head, neck, shoulders, upper thorax, and arms remain free. This has the advantage that the patient, relieved from the feeling of helplessness, can herself bathe her face and neck or moisten a head compress from a bowl with cool water.

Warm and Hot Sitz Baths.—The temperature of these sitz baths ranges between 100° and 110° F. The duration is from ten to twenty minutes. The addition of bran or camomile renders the water softer and more agreeable to the patient.

Bran Baths.—One pound of bran in a bag is boiled in two quarts of water and the decoction is poured into the sitz bath.

Camomile Baths.—A handful of camomile flower is boiled in a quart of water and the extract strained through a sieve into the bath.

The various uses of the warm sitz bath are:

1. As a sedative, to be taken at bedtime, not too hot, but for at least twenty minutes.

2. In inflammatory conditions of the vulva, for instance, in suppurating bartholinitis, where the prolonged hot bath will encourage the spontaneous opening of the abscess.

3. In secondary irritations of the vulva, sitz baths of slightly lower temperature and containing a weak solution of potassium permanganate quickly relieve the discomfort and irritation caused by urinary fistulae, purulent vaginal discharge, etc.

4. In inflamed hemorrhoids or the edema subsequent to operations on the perineum or anus. Here, too, the addition of potassium permanganate or camomile is advisable.

5. In chronic inflammatory conditions of the pelvic organs. The heat of a prolonged sitz bath favors absorption.

6. In painful urination, to relieve the distress of micturition until the specific cause has been remedied.

In all these baths, the patient must be protected from chilling and discomfort due to cramped position in the manner described above.

Moist Compresses.—Moist compresses applied to the abdomen are soothing in abdominal pain of various origins (dysmenorrhea, pelvic infec-

tions, peritoneal irritation) and favor absorption (pyosalpinx, exudates, etc.). They are applied in two forms:

1. A large towel is wrung out of water of 100° to 110° F. and placed in several thicknesses upon the abdomen, to be covered with a blanket and renewed every hour, or oftener.

2. A towel wrung out of water at room temperature is put on the abdomen. Over this comes an impervious material, such as oil silk, oil cloth, "stork sheeting," and the like, in such a way that *this cover overlaps the moist compresses two or three inches on all sides.* As there can be no evaporation, the moist compress gradually becomes warmer and leads to an even warming of the entire abdomen with consecutive hyperemia. This compress requires renewal but once in twelve hours. If the patient becomes conscious of coolness and moisture, the impervious cover must be inspected and adjusted. The effect of this beneficial procedure depends altogether on proper attention

FIG. 133.—THE VAGINAL DOUCHE MUST BE TAKEN IN RECUMBENT POSTURE. The douche nozzle is inserted but a short distance into the vagina (from Findley, *Diseases of Women*).

to technical details, and it is essential to prevent access of air, however small, to the moist pad. I frequently keep the edges of the impervious cover down on the skin by adhesive plaster. Between the applications, the skin should be dried thoroughly, lest it become irritated and itching.

A further advantage of these local packs is their effect upon insomnia.

Vaginal Douches.—The apparatus necessary for giving a vaginal douche consists of a douche can or bag to which a long piece of rubber tubing is attached, and a double nozzle. The rubber "fountain syringe" is in general use, but irrigators of glass or cans of enamel ware are far preferable. The nozzle is made of glass or hard rubber with numerous lateral perforations. The hard rubber nozzle does not stand boiling well and for that reason is usually not kept clean. Bulb syringes, "whirling sprays," and the like are highly objectionable. To clean the douching apparatus in a private home, the patient is instructed to place it in a pillow slip, then put both in a wash

boiler and boil for fifteen minutes. After use, the irrigator is hung up and protected from dust by a towel; the nozzle should always be boiled for each douche.

The proper administration of vaginal douches requires the observance of certain general rules which should not be taken for granted by the physician.

1. The *patient must be in recumbent posture in the bath tub or upon a douche pan.* Only then will the fluid come into direct contact with all parts of the vagina (Fig. 133). If a douche pan is used, a pillow is pushed beneath the hollow of the back so that the patient lies in comfort and without any exertion. Findley is quite right in ascribing to faulty posture the exhaustion that is occasionally complained of after a vaginal douche. The reclining position should be maintained for one-half hour after the douche so as to give the fluid more time to act upon the vaginal walls.

2. All douches must be given with low pressure, that is, the douche bag or can must be but a foot or so higher than the pelvis of the patient. High pressure may force fluid into the uterus and even the peritoneal cavity and cause severe colics. Chrobak reported a case where a piece of a match was found in the uterine cavity following such an improperly given douche.

3. The douche nozzle is introduced only halfway into the vagina. The law of gravity operates within the vagina as well as outside the body, and the fluid itself will sufficiently distend the vagina. For years I have abandoned the usual nozzles and bath specula, the latter meant to spread the vaginal walls apart and thus to facilitate thorough irrigation, and use instead soft rubber catheters which are attached to the irrigator tube by means of a short glass connection. The catheter is readily sterilized and its introduction is painless even where the vaginal entrance is highly sensitive (inflammation, after perineorrhaphy).

Vaginal douches are taken either for cleansing or for therapeutic purposes.

Cleansing douches contain salt (½ per cent), bicarbonate of soda (1 per cent), lysol (¼ per cent), boric acid (2 per cent), liquor aluminii acetici (1 per cent), etc. The temperature is about 110° F., the quantity of fluid two or three quarts, the duration of the procedure ten or more minutes.

Cleansing douches might be taken where there is an abnormal increase of the physiologic secretion or a pathologic discharge, but it must be clear to both patient and physician that the douche in no way can cure the discharge. Where a pessary is worn, daily douches, preferably with soda, and best taken at bedtime, are absolutely necessary to prevent the almost inevitable irritation of the vaginal walls.

On the whole, there ought to be a very good reason for taking such douches. Many women with perfectly healthy genitalia believe that douches are needed as a matter of general cleanliness. This, I believe, is a mistake. The analogy with brushing of the teeth, which is frequently cited in explanation, is fallacious. There is no decomposing matter in the healthy vagina, and the small amount of moisture, which becomes irksome only to the neurotic and introspective woman, is a physiologic phenomenon. Continuous douches with astringents give the mucosa a rough, tanned appearance. Habitual douching with plain water causes maceration of the vaginal epithelium and,

by depriving the vagina of its physiologic lubrication, is the cause rather than the cure of vaginal discharge.

Therapeutic douches serve (1) to bring astringents or antiseptics in contact with the vaginal walls; (2) to affect the circulation.

1. *Medicated douches* are of value only if the pathologic discharge is produced in the vagina itself. If the location of the infection is in the uterus, as in the vast majority of the cases, douching is useless as it does not reach the cause. The practitioner, therefore, should make an exact diagnosis before prescribing a douche injudiciously. At best, the effect of medicated douches is uncertain, because the dilution must be very great. Copious purulent discharge prevents the chemical agent from acting upon the inflamed vaginal wall; hence a mucus-dissolving douche with bicarbonate of soda should precede the medicated douche. For the latter an endless number of drugs have been recommended. The practitioner can get along with very few. Of antiseptics, lysol (¼ to ½ per cent), Lugol's solution (tablespoonful in each quart of water) or silver nitrate (1:1000 to be prepared with *distilled* water) are all that is needed. Carbolic acid and bichlorid of mercury should never be used; the latter particularly may lead to dangerous consequences from absorption, and numerous deaths have been recorded in literature.

Of astringents, the liquor alumin. acetici (tablespoonful in a quart of water) is by far the best. Zinc sulph. or Cupr. sulph. (2 or 3 teaspoonfuls in a quart), tannic acid (tablespoonful in a quart) are likewise to be recommended. Where there is much pain, for instance, in a neglected vaginitis, infected hymenal tears, vulvar ulcerations, etc., 25 drops of tincture of opium added to the douching fluid are useful.

In senile vaginitis and erosions of the cervix, pyroligneous acid (tablespoonful in a quart) gives excellent results.

A necrotic cancer of the cervix or vagina calls for deodorizing and mildly disinfecting douches. Formalin (teaspoonful in a quart) or postassium permanganate (1:2000) may at times be used with advantage. Better still is the application of acetone (Chapter VI).

Medicated douches should not be hot, at any rate not above 104° F. They may be taken morning and evening, and perhaps three times if the suppuration is excessive. To prescribe them four or more times a day is to my mind an unjustifiable procedure.

Generally speaking, both cleansing and medicated douches are used much too often and with too little criticism. Their effect is overrated, and the good that may come from them can well be accomplished by other means.

2. *Prolonged hot douches* without any medicinal ingredients are of undoubted value as hemostyptics or to promote absorption of exudates. If, for instance, the menstruation does not cease after five or six days or returns for days after exertion, coition, or defecation, the protracted hot douche frequently checks the bleeding, provided, of course, the presence of a malignant process can be excluded. Again, in chronic exudates, subinvolution, chronic adnexal disease, etc., the prolonged hot douche improves the circulation and encourages absorption; it also relieves pain and has a sedative and soporific effect.

In this mode of application, the temperature should be between 115° and

120° F. The uterus and vagina are not sensitive to heat, but the vulva and perineum must be protected against burns by a thick layer of vaseline or by giving the douche through a tubular speculum. The quantity of water must be 20 or more quarts which would necessitate the frequent removal and emptying of the douche pan, an annoying and exhausting procedure. A small spout placed at the upper end of the pan, to which a rubber tube is attached, will serve to carry the douche water to a bucket at the side of the bed. Given in this form, the douche can be combined with dry heat from above (Chapter XVIII) and is then productive of most excellent and prompt results.

In private homes where these appliances and competent assistance are

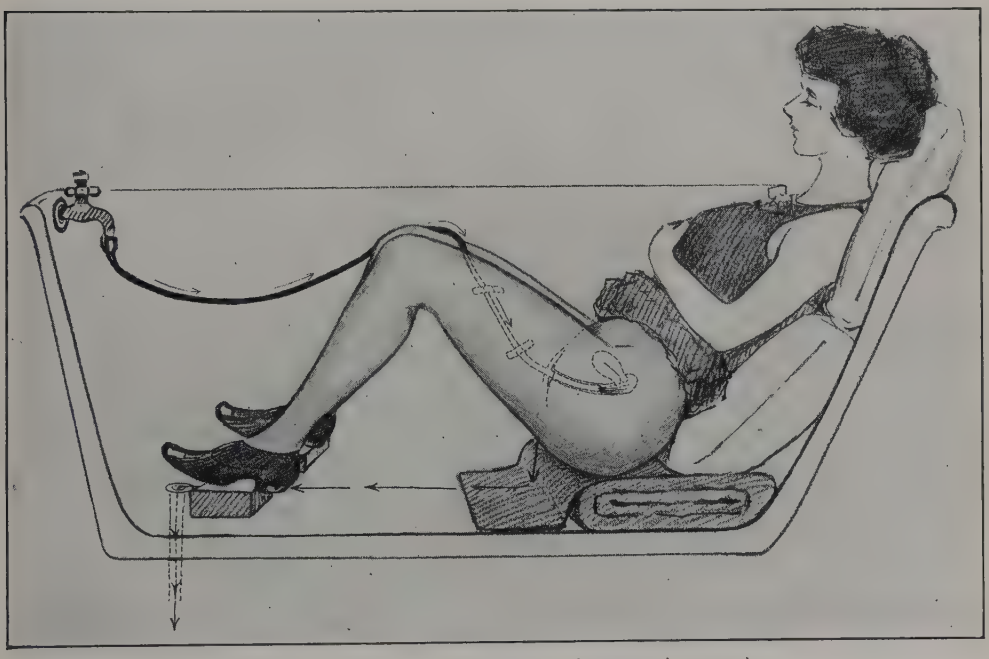


FIG. 134.—PROLONGED VAGINAL DOUCHE (see text).

not available, a much simpler arrangement, mentioned on page 161, has proved of great efficiency.

A soft rubber tubing is firmly attached to the spigot of the bath tub, and the water is so mixed that it will run through the tube under low pressure and at the required temperature. The patient, dressed in a short nightgown, stockings, and slippers, lies on several thicknesses of blankets, which are covered with oil cloth. The back is supported as in the accompanying picture. The buttocks extend an inch beyond the edge of the blanket. The feet rest on bricks, flat irons, wood blocks, or the like. The catheter, attached to the rubber tubing, is inserted into the vagina and fastened to the inside of the thigh by a strip of adhesive plaster. The water runs into the vagina and out into the open waste in a continuous stream without wetting the patient. A leaf or two from the dining room table across the bath tub and a covering blanket (not indicated in the sketch) protect the patient against chilling.

Thus comfortably arranged and without any physical exertion, the patient can take one or two baths of one to three hours' duration each day. There should be a pause every third day to give the vaginal mucosa a chance to recover from the inevitable maceration. Contrary to theoretical considerations, this practically permanent douche has a very pronounced effect both upon the local and general health of the patient. Should there be fever—and the temperature should be taken regularly after the douches during the first few days—it would indicate that the infection is still too recent to permit of this form of treatment. Slight elevations of temperature (to about 100° F.), on the other hand, do not contra-indicate continuation of the treatment. I can heartily recommend this procedure which, in many cases, obviates the necessity of an operation.

Intra-uterine Douches.—The intra-uterine douche may very occasionally be used after labor or abortion; in gynecology proper I know of no condition that would require the irrigation of the uterine cavity. The technic of this method may, therefore, be left to the textbooks on obstetrics, and the practitioner may here be merely warned against the injudicious use of the procedure which is capable of much harm.

LITERATURE

Edgar. Tr. Am. Gynec. Soc., 1904, 29: 280.
Findley. Diseases of Women, 1913, 188.
Houzel. Ann. de Gyn. et d'Obst., 1894, No. 12.
Jaschke, von, and Pankow. Lehrb. d. Gynaek., 1921, 6th ed., 777.
Kisch. Encyklopaedia d. Geb. u. Gyn., 1900, 100.
Matthes. Lehrb. d. klin. Hydrotherapie, 1900.
Maxwell and Pope. Practical Nursing, 1914, 3d ed.
Tobias. Mediz. Klinik, 1922, 18: 182.
Winternitz. Die Hydrotherapie auf physiol. und klin. Grundlage, 1890, 1: 493.

CHAPTER XVIII

DRY HEAT

We have seen in the preceding chapter that heat in the form of baths, douches, and compresses is frequently used with advantage in gynecology and that its principal virtue lies in alleviating pain and favoring absorption. In order to understand the mechanism of this beneficial effect we must go back to the investigations of Bier who first called attention to the fact that in the animal body the normal growth of an organ as well as its physiologic activity, its function, is invariably associated with hyperemia. Hyperemia may likewise be found in all pathologic conditions irrespective of their origin, but never anemia. We are thus forced to the conclusion that this hyperemia represents the reaction of the organism against disease; in other words, the body utilizes hyperemia as one of its defensive means by which it endeavors to overthrow its enemies. If this be true, we can do no better in the treatment of disease than to imitate the natural processes of cure through an artificial production of hyperemia.

Physiology has taught us that there are two kinds of hyperemia—an active, or arterial, and a passive, or venous. It is the active hyperemia which concerns us here. It is characterized by an increase of arterial blood in a given part of the body and has the property of promoting absorption and reducing pain.

Of the various means of producing such an active hyperemia, heat is the best, and from what has been said above, it follows that the more heat we can apply within physiologic limits, the more intense will be the hyperemia and the more pronounced its beneficial influence. As a matter of practical experience, moist heat can be borne by the body only to a very limited degree. Experiments have shown that a full bath of eight minutes in water of 114° F. is dangerous to life. The hands may be immersed in water of 123° F. at most, and water of 140° F. causes intense burning in the integuments. About twenty years ago, Bier showed us that for therapeutic purposes dry superheated air could be tolerated at much higher degrees and the proportion of active hyperemia correspondingly increased, and still more recently diathermy has been suggested with the same end in view. These two methods will now be discussed.

Heated Air.—In 1919, I presented a paper on this subject to which the reader is referred for details. It may suffice here to say that the most convenient way of applying heated air is by means of electric light bulbs. My original model, modified after an apparatus suggested by Kehrer, consisted of a semicircular cradle of sheet iron covered on the inside with asbestos. The material used at present is aluminum which makes the appliance very light.

The cradle bears inside a number of electric light bulbs, and a long cord furnishes the connection with the nearest light switch (Fig. 135). Various instrument houses have now put similar appliances in handy forms on the market.

The mode of application is exceedingly simple. The part of the body to be heated is bared; this, in most cases, is the lower abdomen. The apparatus is placed over the abdomen, the lights are turned on, and a blanket is put snugly over the apparatus, making the air chamber as small as possible and preventing hot air from escaping; the smaller the area exposed, the greater the amount of heat tolerated. Therefore, all parts beneath the cradle which are not involved in the pathologic process to be treated are covered with towels; these are the iliac bones which, poorly protected by adipose tissue,

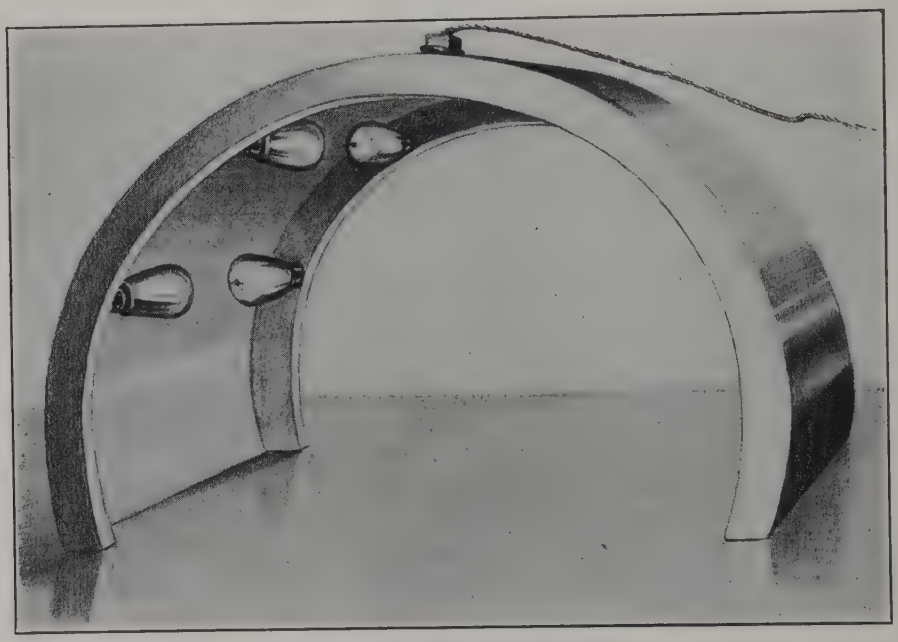


Fig. 135.—Dry Heat Apparatus.

are very sensitive to the heat, the lumbar regions and the upper portions of the thighs. A cold moist cloth—not an ice-bag—is placed on the forehead of the patient, and she is urged to drink large quantities of water.

With all eight lights burning, a temperature of from 200° to 220° F. is reached within twenty minutes. The immediate result is a profuse perspiration all over the body, but chiefly in the exposed area. Unless this perspiration is wiped off from time to time, the beads of moisture will be heated to such a degree as to cause blisters.

The patients, at first, feel quite comfortable. After about ten minutes, when the temperature reaches about 180° F., they frequently complain of an intense burning. It is imperative to be guided by the sensation of the patients and to discontinue the treatment for the time being. We will notice, however, that the sensitiveness decreases at each following application so

that after a few days the patient will bear the baking process for one-half hour and even longer. The skin of the exposed part becomes intensely red, either diffusely or in more circumscribed areas. In some cases, dark brown zones remain which are due to the pigment of destroyed blood corpuscles; these pigmentations disappear in time. Burns can be avoided with proper care. Weak and anemic patients may occasionally complain of excessive fatigue, palpations, vertigo and even nausea, but such by-effects are uncommon.

There is no hard and fast rule as to the length of each treatment. It is preferable to apply the heat about ten or fifteen minutes the first time until we see how the patient will react. Gradually the treatment is lengthened to thirty or forty minutes, *but in no case should the temperature be raised when the patient complains of the heat.* After the treatment, the patients should be permitted to cool off gradually by leaving them in the apparatus for one-half hour longer or by wrapping them in warm blankets. Wherever feasible they should receive a cool sponge bath or an alcohol rub. A combination of the hot-air treatment with other conservative methods, such as vaginal douches, ichthyol-glycerin tampons, weighting, etc., will be found very useful. The treatments are given daily; in robust patients I have at times applied them twice a day.

The immediate effect of the treatment is a marked decrease of pain. This subjective improvement is often so pronounced that it alone would justify the application of heat. The pain will return after a time, but its intensity decreases with each subsequent treatment. The appetite frequently improves very much; and not only during the treatment, but afterwards as well, larger quantities of water are taken. It may be due to this increased metabolism that many women gain in weight and lose their former constipation. In several cases, on the other hand, I found the disfiguring accumulation of fat at the hips reduced. Most patients experience a pleasant sensation of relaxation and have a refreshing sleep, particularly when they are given a cool sponge bath immediately after the treatment. It is a rather rare occurrence that highly nervous women become unduly excited and irritated; in such cases the treatment must be given up. The remote results are, as a rule, equally gratifying. In chronic exudates, pain and pressure symptoms subside rather quickly even if no perceptible change in the size of the mass can be felt on palpation. In the large majority of instances, however, an objective absorption keeps step with the subjective improvement. It is difficult to gauge beforehand the number of treatments required in such cases; they varied in my experience from eight to thirty-five. The voluminous literature on the subject has been considered in the paper previously mentioned. Fever present before or occurring during the treatment is a contra-indication to the use of hot air. Slight rises around 100° F. need not deter us.

In abnormally scanty menstruations of infantilistic girls and even in amenorrhea I have, like others, observed a number of favorable results from this therapy. The hyperemia obviously brought about a better nutrition of the ovaries and with it an increase in function.

It may be added, though this is beyond the scope of our book, that dry

heat may be used with marked success in the management of patients after operation. Applied in shock after severe and prolonged laparotomies, it supplies external heat to the body more rapidly than any other method. It also reduces the pain of intestinal distention on the first few days following operation and gives very decided relief in the painful swelling of fresh abdominal or perineal wounds.

In this brief review of the uses of dry heat there has neither been a complete enumeration of the conditions in which it is applicable, nor is there an intention to proclaim the method as a panacea. It has its failures like any other mode of treatment and it is apt to exhibit its best results when properly combined with other suitable procedures according to the needs of the individual case.

Diathermy.—Diathermy or thermopenetration is a method which was introduced into practical medicine about ten years ago and is beginning to claim a place for itself in gynecologic therapy. As the word implies, diathermy is a method of heat-penetration, but there is in this procedure an essential difference from the ordinary utilization of heat in which the heat is applied *from without* either through contact with a heating medium (hot water bag) or by radiation (hot air). In diathermy, heat originates *within* the body. A high frequency current, by passing through the body or certain parts of it, transforms its electric energy into heat because of the resistance of the living tissue. The current flowing from an outer large electrode to a smaller electrode in the vagina or rectum, thus heats the tissues through which it travels, particularly in the neighborhood of the smaller electrode, because the diminution of the size of the latter causes an increase of the density of the current whereby its heating power is proportionately increased. This explains that the penetration of heat transmitted from without and raising the temperature of the skin only cannot be compared with the depth-effect of diathermy, where heat ranging from 40° to 50° C. (104° to 122° F.) is produced within the affected tissues themselves. In addition it is possible that obscure electric effects upon the organism may be at work, perhaps in the sense of intensifying the vitality of the tissues.[1] At any rate, all observers agree as to the beneficial results from this treatment. It has been used in chronic inflammations of the adnexa, in old exudates, and in chronic posterior parametritis as well as in cases of old adhesions with fixation of organs; in this latter group, the relief from pain was particularly noticeable. While it proved of no value, and even made matters worse, in neurasthenic and hysteric individuals where there was pain without any anatomical basis, the genuine neuralgias in pregnancy, sciatica, coccycodynia, etc., were very promptly relieved.

The application of diathermy presupposes a working knowledge of electricity and requires familiarity with the important technical details. As to the latter, the reader is referred to the writings of Blumreich, Cumberbatch, Lindemann, Sperling, and Rieder.

[1] Dr. Ralph Pemberton, of Philadelphia, has called my attention to his studies of the blood gases during the therapeutic application of heat (hot baths, dry heat, diathermy) which throw considerable light upon the nature of the response of the body to heat. There is a rise in the percentage saturation of oxygen in the peripheral venous blood.

LITERATURE

Bier. Hyperaemie als Heilmittel, 5th ed., 1907.
Blumreich. Arch. f. Gynäk., 1918, 109: 204.
Cumberbatch. In Fairbairn's Obstetrics and Gynaecology, London, 1921, 878.
Gellhorn. Am. Journ. Obst., 1909, 60: 31.
Landois. Lehrb. d. Phys. d. Menschen, 1891, 426.
Lindemann. München. med. Wchnschr., 1917, 64, No. 21.
Rieder. In Schwalbe's Therapeut. Technik, Leipzig, 3d ed., 233.
Sperling. Monatschr. f. Geburtsh. u. Gynäk., 1921, 54: 309.

This indicates a heightened blood flow as the result of which the usual amount of oxygen is not removed by the tissues. With this, an increased tissue metabolism goes hand in hand. Interesting changes are also observed to take place in the sweat. In normal individuals the sweat may be acid, neutral, or alkaline and is generally around the neutral point. Certain pathological conditions may at times be accompanied by an excessively acid sweat. As the result of exposure to heat, the sweat in normal individuals invariably changes its reaction, becoming less acid, neutral, alkaline, or more alkaline, depending on what it was at the start; in other words, the change is always toward the alkaline side. At the same time the urine not infrequently becomes more alkaline. These changes are due to the fact that acid of some nature is lost from the body, chiefly in the form of carbon dioxide which escapes through the lungs, urine, and sweat, in the order of magnitude named. There is also an elimination of lactic acid and some other organic acids, whose nature is not known, through the sweat and urine. This combined loss of acids brings about an alkalosis which also manifests itself in a greater alkalinity of the reaction of the blood. The alkaline wave of elimination is a compensatory attempt to meet this condition. If the exposure to heat be unduly prolonged or severe, elimination becomes inadequate, and the condition of tetany may result.

These observations explain some of the favorable results which follow the therapeutic application of heat and also some of the harmful consequences when uncritically applied. The reader is also referred to an article by Pemberton and Crouter in Journ. Am. Med. Assn., Febr. 23, 1923.

CHAPTER XIX

MEDICAL GYMNASTICS

Medical gymnastics is the systematic exercise of the muscles and other tissues of the body for therapeutic purposes and may be divided into active movements and passive movements; the latter again are divided into massage and motions by means of special apparatus.

Active Exercises.—The physical training in our public schools is of inestimable value in the development of the bodies of children, and the establishment of public playgrounds and baths testifies that public conscience is awake to the responsibilities the community owes to the growing generation. Unfortunately, the splendid beginning made is largely lost after school age when the girl becomes a wage earner and is forced to lead a weakening indoor life in the sewing room or the shop, in an office or a factory, or as a household drudge should she marry. The daughters of the well-to-do with their greater advantages can indulge in golf, tennis, riding and other forms of outdoor exercise which produce that healthy, vigorous type of womanhood of which we may justly be proud. But even in these more fortunate girls marriage means, in only too many instances, the end of most of their former physical activities, and the demands of "social duties" and the motor car are responsible to a great measure for a general let-down, a muscular deterioration which sooner or later makes of them subjects of medical attention.

It is safe to say that women *do not* walk enough—to which your patients almost invariably will reply that they are up and on their feet in their homes or their places of work from morning till night. This is exertion, not exercise, and it is the walking in fresh air and sunshine that counts. Where, however, outdoor exercise cannot be practiced, indoor exercises should take its place. A number of more or less elaborate "systems" are to be found in any bookstore. The medical reader is referred to the very simple outline of the principal exercises in Findley's textbook by which the general physical development can be improved.

Such systematic exercises are of incalculable value in the management of juvenile infantilistic and asthenic patients in whom deficient physical development goes hand in hand with deficient sexual development. A mild form of gymnastic training is also of great importance in women of advanced years in whom, from a natural disinclination to physical activity, the muscles become relaxed and atrophic, a factor which intensifies the physiologic accumulation of fat after the menopause.

During the reproductive period of life, the muscles of the abdominal walls and pelvic floor are weakened by the influence of pregnancy and labor which results in more or less permanent functional disability of these muscle groups.

It is not so very long ago that this untoward effect of woman's most important natural function was considered inevitable, but we have come to appreciate the value and possibilities of preventive measures.

It is true that by an abnormally large child, by hydramios, twins, or dystocia in contracted pelvis the abdominal walls may be so overstretched that their involution is impossible. It is also true that sometimes the pelvic floor may be so torn that, in spite of repair, its full function is lost. Yet in most cases proper prophylaxis in the puerperium is capable of bringing about an almost complete restoration of these two muscle groups and thereby may prevent a long train of gynecologic troubles (constipation, enteroptosis, displacements, descensus, prolapse, etc.). The obstetrician who neglects this precaution can no longer be considered to be modern.

FIG. 136.—EXERCISE TO STRENGTHEN THE RECTI MUSCLES.

I shall here describe only three of the most valuable exercises, hoping that the interested reader will consult the appended references and other works for a more complete exposition of the matter.

First exercise. Lying on her back and with her arms crossed on the chest, the patient raises her head and shoulders, at first just enough to clear the bed, later carrying the exercise to the sitting posture (Fig. 136). The exercise is made harder and therefore more effectual if the feet are crossed and arms clasped behind the head (Fig. 137). This movement practiced two or three times a day and repeated at a gradually increasing rate each time strengthens the recti muscles and abolishes their diastasis.

Second exercise. The legs fully extended are raised alternately to the vertical. Later, both legs are raised simultaneously, beginning, as a rule, with lifting merely the heels off the bed. By these gradually intensified movements the lateral muscles of the trunk are strengthened.

Third exercise. With the feet slightly apart, the knees are bent to almost

a right angle and the buttocks are raised so that the body rests only on the soles and shoulders (Fig. 138). In this position the knees are pressed together and *at the same time* the gluteal muscles are contracted as if trying to check a bowel movement. Thereby the levator ani muscles are stimulated to powerful contraction and thus strengthened.

FIG. 137.—THE SAME EXERCISE MADE HARDER BY PUTTING THE HANDS BEHIND THE HEAD AND CROSSING THE FEET.

FIG. 138.—BY RAISING THE TRUNK OFF THE BED UNTIL THE BODY IS SUPPORTED ONLY BY SHOULDERS AND FEET, AND PRESSING THE KNEES TOGETHER, THE MUSCLES OF THE PELVIC FLOOR ARE EXERCISED.

These exercises are commenced as early as the third or fourth day after labor unless a complication forbids; where extensive perineal tears have been repaired, I usually wait eight days.

Deep-breathing exercises in a well ventilated room will favorably affect the circulation in the pelvic organs and counteract congestion.

At the same time attention should be paid to the feet in the manner described in the chapter on backache.

Passive Exercises.—Passive motions by means of specially constructed, so-called Swedish apparatus are not generally used in gynecology. In our field we are more particularly concerned with massage. The value of massage is definitely established, and it is well known that by it the circulation is improved, the blood-pressure may be diminished, the absorption of waste products hastened, nerves and muscles strengthened, the restlessness and insomnia of neurasthenic patients lessened, and so on. Unfortunately, massage is but an empty word to many physicians and, while this form of treatment should always be carried out by specially trained persons, yet, the practitioner should at least have a general idea of what constitutes massage. It is medical ignorance on this subject and the resulting aversion to its employment that to a large extent has been responsible for the spread of osteopathy, chiropractic and similar cults. Massage comprises:

1. Effleurage, or stroking, which is given from the periphery to the heart and should be given at the beginning and ending of all treatments.

2. Pétrissage, or kneading, by which the muscles are stretched away from the bone in the direction of the venous current, and the blood-vessels alternatingly emptied and refilled by the alternate pressure and relaxation of the operator's hand while performing the movement.

3. Friction, or rubbing, by means of small successive circles over the prescribed area without moving the skin.

4. Tapôtement, or percussion, with the ulnar edge of the hand, the palm, the tips of the fingers, or the closed hand.

5. Pressure with the cushion of the fingers or the knuckles along the course of nerves or vessels, the so-called Cornelius method, which is highly sedative in neuralgic pains. (Maxwell and Pope.)

It may be added that there are nowadays instruments on the market for the purpose of so-called vibration-massage which in a way substitute for manual massage.

In the treatment of habitual constipation, enteroptosis, etc., a massage ball may be used by the patient herself. This is a heavy wooden ball filled with shot. Auerbach, some years ago, designed a handy form (Fig. 139).

About thirty years ago a special form of gynecologic massage was in vogue which was introduced by the Swedish Major Thure Brandt. The principle was to apply the kneading and friction movements to the genital organs, and the technic consisted in the main in steadying the uterus with two fingers introduced into the vagina while the other hand, in circular motions through the abdominal wall, gradually advanced into the depth of the pelvis and directly manipulated the organs against the resistance of the inner fingers. By this method, adhesions about the uterus could be stretched or broken, old exudates be removed, and various pelvic symptoms (pain, dysmenorrhea, certain forms of sterility, etc.) be overcome.

That many of these claims were true has been attested by numerous trustworthy observers. As against this, there are two very weighty objections to intrapelvic massage, namely:

1. The possibility that an old inflammatory process may flare up under the treatment.

2. The great length of time it requires, and the excessive demands on the perseverance of physician and patient. The long-continued handling of the genital organs may, in the latter, considerably contribute to nervousness and, in not a few, bring forth undesirable sexual irritations.

Personally, I have abandoned this form of treatment for many years, and only in very old exudates in the culdesac and particularly in the chronic thickening of the sacro-uterine ligaments have I employed it occasionally of late years—and with fairly satisfactory result I wish to add. Even in these,

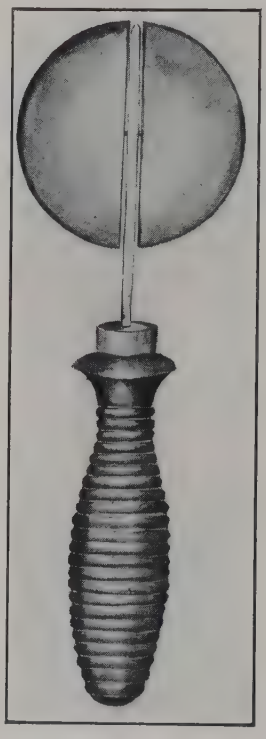


Fig. 139.

Fig. 140.

Fig. 139.—Massage Ball, useful in Chronic Constipation.
Fig. 140.—Braun's Colpeurynter (Kny-Scheerer).

I prefer, as a rule, the "pressure-weight treatment" which may well be considered a method of massage.

This treatment is carried out by means of a Braun colpeurynter (Fig. 140), a simple rubber bag which terminates in a tube, from 15 to 20 cm. in length. The patient lies in a comfortable recumbent position on a bed or couch the foot of which is elevated about 50 or 60 cm. The empty bag is folded about itself, introduced into the vagina and filled, through a glass funnel, at first with 250 to 500 grams of metallic mercury, increasing at subsequent treatments the quantity gradually to 1,000 grams if the patient suffers no discomfort. The tube is now clamped and the funnel removed. A sand bag of from two to four pounds is placed on the lower abdomen for the purpose of

counterpressure. If the weight is to be exerted more on one side than the other, the patient may turn to the corresponding side and the abdominal bag can be placed in position by a bandage. The patient remains in this position from one-half to one hour once a day; the abdominal bag is then removed, the colpeurynter emptied, and the bed lowered to the horizontal. The treatment may be applied every day or every other day and gives best results if combined with other conservative means.

The principal field for this treatment is in chronic pelvic exudates. The fluid in the tissues is squeezed out by the pressure; as soon as the latter is released, the tissues fill immediately with fresh blood, and this arterial hyperemia favors absorption. This forced massage, however, is applicable only where there has been no rise in temperature for at least two weeks; at reappearance of fever the treatment must be interrupted. In suitable cases, the method yields very satisfactory results and should be resorted to by the practitioner. At present it seems difficult to obtain the Braun bags in this country, and one may have to substitute long, narrow ice-caps such as are used for the throat.

LITERATURE

AUERBACH. Therapeut. Monatshefte, 1914, 28: 175.
FINDLEY. Diseases of Women, Phila. and New York, 1913.
GELLHORN. Interstate Med. Journ., 1909, 16, No. 9; also Lancet-Clinic, June 20, 1914.
——— St. Louis Courier of Med., 1904, 26, No. 4.
JASCHKE, VON, and PANKOW. Lehrb. d. Gynäk., Berlin, 1920.
MAXWELL and POPE. Practical Nursing, New York and London, 1914.
MENNELL. In Fairbairn's Obstetrics and Gynaecology, London, 1921.

CHAPTER XX

NASAL THERAPY

The sense of smell plays a very important part in the sexual life. In the animal world it is probably of greater moment than the sense of sight. Nature provides most mammals, amphibia, and reptiles with accessory sexual glands the scent of which, during the period of rut, is intended to attract the animal of the opposite sex. Male rabbits whose organs of smell have been destroyed are unable to distinguish the female by either sight or touch, and in early castrated animals, such as deer, antelope, and sheep, the development of these sexual glands is altogether arrested.

In the human species the sense of smell has become blunted to a large extent; yet it is still one of the most powerful sexual excitants. The Homeric poems, the Song of Songs, and many other erotic works throughout the ages extol strong body odors and testify to the close connection between the nose and the genital organs.

To narrow this discussion at once down to the female sex, vicarious menstruation is more often manifested by bleeding from the nose than from any other part of the body.

"Individuals who menstruate normally are often prone to epistaxis during the period. During the time of puberty nosebleeds are very common. Anomalies of secretion are often seen at the time of catamenia and may consist either of acute nasal catarrh with profuse secretion or of abnormal dryness of the nasal mucous membranes. Disturbances in the sense of smell are sometimes observed during menstruation, evinced usually by an increase of sensitiveness or by perversions.

"Cohabitation is sometimes attended with acute swelling and discharge from the nasal mucous membranes, sometimes with unnatural dryness of the nose and throat.

"Kermauner has observed an abnormal lack of nasal secretion in those who habitually masturbate; and in the young who are addicted to the habit, he recognizes a characteristic expression caused by a thickening of the nose and lips similar to that produced by certain diseases of the hypophysis.

"Finally, at the time of the climacteric one sometimes sees a severe intractable nasal catarrh associated with hyperesthesia of the fifth nerve. Other abnormalities mentioned by Kermauner, as occurring at the change of life, are dryness and stoppage of the nose, adenoid and polypoid growths, and eczema extending from the outer skin of the nostrils to the mucous membrane lining." (Graves.)

Some of these relations between the nose and the genitals were known though their nature was not understood, when, in 1897, Wilhelm Fliess, of Berlin, came forth with a startling discovery pertaining to this subject. Fliess found certain areas in the nose—"genital spots" he called them—which underwent definite changes before and during each menstruation. These areas are the anterior half of the lower turbinate and the tubercle of the nasal septum, both localities being distinguished by an abundance of blood-vessels and nerves. During the premenstrual and menstrual periods, these genital spots are invariably swollen and more prominent, bleed more readily upon slight touch, and are exceedingly hyperesthetic. All of these characteristics disappear with the termination of the menstruation, leaving a normal appearance of the mucosa behind, but repeat the cycle after a few weeks, synchronously with the approaching menstruation; in fact, Fliess, Siegmund, and others could foretell by inspection of the nose whether or not a period was imminent, unless, of course, a pathologic condition within the nose had brought about a permanent alteration of the mucosa.

Fliess found further that he could, from the nose, influence the uterus, for by cocainizing the "genital spots" he almost instantaneously relieved the severe colicky pain in certain forms of dysmenorrhea. He even contended that cocainization of only the lower turbinates checked the pain in the abdomen, whereas cocainization of only the nasal septum allayed the pain in the back.

On the strength of his remarkable observations, Fliess proclaimed the existence of a most intimate connection between nose and genitals by way of the sympathetic nervous system and he worked out a somewhat complicated theory according to which the two organs stood in a reciprocal reflex relation. The details of this theory of nasal reflex neuroses must here be omitted; neither is it possible to do more than mention the spirited discussions in which the theoretical explanations of Fliess were subjected to searching criticisms. As to the actual facts, however, there was no dissension, and both friends and opponents of the new theory agreed that the treatment did what Fliess claimed for it, in short, that certain gynecologic ailments could be relieved or cured by nasal therapy.

The technic is as follows: The genital spots are exposed in a nasal speculum and are touched with a fine cotton applicator which has been dipped in a 20 per cent cocain solution. By adding adrenalin, a weaker solution of cocaine may be used; two drops of a 10 per cent cocaine solution and one drop of adrenalin (1:1000) are sufficient. The cotton containing this solution is kept in contact with the various areas for from ten to twenty seconds. After eight or ten minutes the effect is noticeable—the swollen genital spots are shrunken, and the dysmenorrheal pain in a suitable case (see below) is relieved.

To the practitioner and gynecologist who may lack the specialist's skill and needed appliances, including lamp and reflector, the simple method of spraying the cocain solution into the nose with an atomizer is to be recommended, as no harm can come from cocainizing larger areas than merely the genital spots.

This is the so-called cocaine experiment. If it is successful, it proves

that the case is suited for nasal treatment. Its effect is, of course, only transient; the patient is relieved for six or eight hours, or, perhaps, for the entire duration of the present menstruation.

There is no objection to repeating the treatment at the next menstruation if one is satisfied with symptomatic relief. A *permanent cure,* on the other hand, requires destruction of the genital spots once the suitability of the case for nasal treatment has been demonstrated.

This may be done either by cauterization with trichloracetic acid or by electrolysis. Both these methods should be left to the rhinologic specialist, but it is the gynecologist and the practitioner who should attend to the cocaine experiment and determine whether or not a case is suited for nasal treatment. To decide this question, he must carefully select the case by a thorough gynecologic examination and painstaking attention to the history of the patient. The indiscriminate application of the cocain experiment in all cases of dysmenorrhea must be condemned as unscientific and certain to bring a most valuable method into discredit.

Fliess himself excluded from the very beginning the cases of obstructive dysmenorrhea. In these, the pain is caused by a stenosis of the internal os and is most intense *before* the menstruation; the colic disappears immediately after the onset of free flow. The treatment of this class of cases is discussed elsewhere.

In a second category, painful menstruation is due to organic disturbances within the genital sphere, for instance, pelvic infections, displacements, tumors. In such cases it is illogical to expect any result from nasal therapy; where it has been tried it has usually been a failure.

There remain the cases of dysmenorrhea in which only very minor organic disorders or none at all can be found on examination. These, whose number is legion, form the most suitable material for the Fliess treatment. They are either young girls or they belong to the host of "nervous" women. In the latter, the very multiplicity and intensity of their complaints as contrasted with the dearth of objective local findings is highly suggestive. General signs justifying the classification are: circumscribed areas of hyperesthesia of the skin, increased tendon reflexes, tremor, muscular weakness, mydriasis, tachycardia, at times with arhythmia, instability of the vasomotors, as evidenced by alternate blushing and pallor, coolness of hands and feet, etc. As to the menstruation, the pain is very severe and colicky in character; it usually occurs *after* the onset of flow and lasts for from one half to three days. Quite generally it is associated with headache, migraine, dizziness, nausea, and vomiting.

It is in this last category of patients without organic findings that the Fliess treatment has its great field of usefulness. A few figures may prove this statement. Schiff relieved 34 out of 47 cases of dysmenorrhea (73 per cent) by the cocain experiment. Of 17 cases treated with cauterization and electrolysis, 12 were cured permanently. Knorr, in 15 cases, obtained relief in 12. In Ephraim's 24 cocaine experiments, 18 were positive; of 8 cauterized patients 4 were cured definitely. In this country, O'Reilly saw improvement or cure in 5 out of 6 cases. Brettauer and Mayer in a total of 81 cases

recorded permanent cure in 48, improvement in 14, and failure in 19. These cases presented no organic lesions, but all had premenstrual headache and nausea, and menstrual colic after the onset of flow.

It is not surprising that with the cessation of pain and anticipation of trouble the psychic derangements of dysmenorrhea, such as weepiness, irritability, etc., likewise cease.

How much, in general, improper selection of cases and deficient technic contribute to the percentage of failure, is difficult to say. It is probable that in a certain number of cases the original cause of the dysmenorrhea must be operative in the recurrence of painful menstruation. After all, every dysmenorrhea is due to a definite cause even if there be no organic lesion in the genital system itself. It is therefore essential to find and eliminate this original cause. In some cases this may be masturbation which, however, is more often suspected than definitely determined. Unhealthy sexual habits, such as coitus interruptus or perversions, may have to be corrected if possible. A general nervousness requires careful study into constitutional factors and mode of life and demands of the physician an intelligent and hygienic regulation of the patient's mode of life. In this, therefore, as in any other method of therapy, the treatment of the organism should not be neglected over the treatment of an organ.

Nasal therapy has also been used in *membranous dysmenorrhea.* Koblanck, Siegmund, Mueller, and others have not only relieved the pain, but prevented the formation of membranes by this treatment. Koblanck says, however, in the last edition of his Manual, that in his cases the cure was not permanent; after some months, membranes were again expelled though with much less pain.

In a number of cases recorded in literature, sterility has been cured by nasal treatment. The explanation is difficult to give. There is a multitude of causes of sterility, and if any treatment has the desired effect, the critical mind instinctively refuses to accept a *post hoc ergo propter hoc,* particularly as all of us know of women who have conceived after a sterility of ten or more years without undergoing any sort of treatment. Coincidence may, therefore, play an important part. It may be, as Koblanck suggests, that by nasal treatment a nervous spasm of the uterus was relieved, or abnormal nerve inhibitions were abolished. Be that as it may, I merely state that Brettauer recorded conception shortly after the treatment in four women who had been sterile for years. Of twelve women whom Koblanck treated for sterility by the Fliess method, nine became pregnant; four immediately after the treatment, and five a few months later. Among them were several women who had been sterile for more than ten years.

Koblanck who, among the gynecologists, has been the most enthusiastic advocate of the Fliess treatment, sees further in this method a very valuable adjunct in the therapy of masturbation.

Nymphomania and those homosexual perversions that are due to an excessive sexual instinct are probably ameliorated by the nasal treatment. A suggestive case is reported by Siegmund. He was called at night to see a woman with a severe migraine and cured the latter at once by cocainization

of the genital spots. Soon after his departure, this patient had sexual intercourse which, for the first time in her life, took place without any voluptas.

This clinical observation has been confirmed by the following animal experiment conducted by Lange. If a mare is in heat, she stands with her hind legs far apart and continually opens and closes the vulva with an audible sound which attracts the stallion. In such an instance, Lange sprayed cocain into the nose of the horse with the result that the motion of the vulva ceased and the mare lost her sexual excitement.

We cannot leave this subject without mentioning that Fliess also claimed to have relieved the dilatation pain of the first stage of labor. My own experiences have not been encouraging, but every now and then satisfactory results are reported in literature. Thus Stiassny, of Vienna, and Mahn, of Paris, both writing in 1910, believe to have thereby rendered labor less painful without harm to mother and child. Even without this obstetrical applicability, the nasal therapy of Fliess deserves much more attention than it has received from practitioners. Though its field be limited and its results not any more uniform than that of any other method, the fact cannot be denied that a large number of patients can temporarily or permanently be relieved of the distress of painful menstruation. A trial is extremely simple and, if the cases are properly selected, highly promising of satisfactory results.

Another form of nasal treatment for dysmenorrhea, yet essentially different from the Fliess method, has recently been suggested by Wormser. This author introduces a few drops of ether into the nose in the following manner: A small pledget of cotton soaked with ether is pushed into the nostril. The head is bent far backward, and the nose is now compressed with two fingers, so that a few drops of liquid ether are squeezed out into the upper nasal passages. The procedure is repeated on the other side with a fresh ether tampon. There are a few seconds of unpleasant sensation while the ether runs upward, but this is followed almost instantaneously by a perfect well-being. Sometimes relief is delayed for a few minutes, but real failures are not to be expected unless the dysmenorrhea is due to stenosis or inflammation. The relief lasts several hours. When the pain returns, it is never so severe and again yields readily to a repetition of the procedure.

Wormser found that his treatment remained efficacious no matter how many months it was applied, and while my own experience with the method is of rather recent date, I can confirm the accuracy of his contention. I recall, for instance, the case of a trained nurse who was disabled for three days each month by a most severe dysmenorrhea. Her genitalia were normal, her hymen intact. I instructed her to call me at the time of the next attack and then I found her in bed writhing with pain. A few drops of ether introduced into each nostril according to Wormser's instructions checked the seizure immediately and left her painless for the remainder of the menstruation.

Wormser assumes that the prompt effect is due to an ether-rausch of the cramp center. He excludes the possibility of suggestion because the method is successful only in the essential or idiopathic dysmenorrhea, but fails where there are anatomical causes (stenosis, tumor, inflammation) of the affection.

Instead of the cotton pledget a nasal spray may be used; the main point is that the ether reaches the upper parts of the nose, not vaporized but in liquid form.

LITERATURE

Brettauer. Surg., Gynec., and Obst., 1913, 17: 381.
Fliess. Die Beziehungen zwischen Nase und Weibl. Geschlechtsorganen, 1897.
——— Ueber den ursaechlichen Zusammenhang von Nase und Geschlechtsorgan, etc., 1910.
Graves. Gynecology, 1918, 2d ed., 99.
Koblanck. Taschenb. f. Frauenheilkunde, 1921, 3d ed., 256.
Mayer. Journ. Am. Med. Assoc., 1914, 62: 6.
Mueller. Arch. f. Laryng. und Rhinol., 1918, 31: 304.
Novak. Menstruation and Its Disorders, D. Appleton & Co., 1922.
O'Reilly. Am. Journ. Obst., 1915, 72: 634.
Siegmund. Ztschr. f. Geburtsh. u. Gynäk., 1908, 62: 309.
Tridon. Psychoanalysis and Love, 1922, 58.
Wormser. Arch. f. Gynäk., 1918, 109: 736.

CHAPTER XXI

PSYCHOTHERAPY

Psychotherapy is based upon the observation now generally recognized that psychical processes may influence physical processes both in a favorable and an unfavorable way, and may further simulate and imitate bodily ailments to such a degree that, under certain circumstances, it may be almost, if not altogether, impossible to discover the true state of affairs. (Opitz.)

Even organs which are not subject to the will may be influenced psychically, and I need mention only such common experiences as the pallid cheek of fear, the blushing of embarrassment, or the perspiring palms when watching the daring exploits of a circus performer.

In the field of gynecology and obstetrics the influence of the psyche upon the body is particularly marked and well known to any observant practitioner. To select a few examples at random, shock as a cause of abortion is well recognized, just as in other cases it may suddenly check menstruation. Conversely, in the case of a woman admitted for operation, the excitement of admission, the anxiety as to what is before her, and the preparation for operation, may bring on an unanticipated period. Schoolgirls may have painless menstruation during vacations but suffer severely from dysmenorrhea during the school term due to overstrain. The frequent passage of large quantities of pale urine in the daytime, but not at night, usually signifies nervousness, and frequent watery bowel actions resembling mucous colitis are generally attributed to the same cause. The agonizing fear of illicit conception as well as the equally intense desire for offspring may cause amenorrhea and produce a clinical picture which closely resembles pregnancy, the "grossesse nerveuse" of the French. Even in a real puerperium, worry about sufficient milk supply may actually reduce the output of the mammary glands.

Where, then, the psyche plays so important a part in the production of pathologic conditions or pathologic conceptions and symptoms, it seems a very simple logic to utilize this same psychic element also therapeutically for the benefit of our patients; but it would be a futile undertaking to search for a due consideration of psychotherapy in any of our popular textbooks on gynecology.

Consciously or unconsciously, every physician practices psychotherapy in every disease. The reputation of the practitioner and his entire behavior, his appearance and his manner in meeting patients determine to a large degree whether or not he will acquire an influence over his patients which will enable him to exert a salutary psychic effect. In life it is so often the first im-

pression that counts and this is particularly true of the relations between physician and patient.

> "I do not like thee, Dr. Fell,
> The reason why, I cannot tell,
> But this I know, and know full well,
> I do not like thee, Dr. Fell."

That verdict is final, even if Dr. Fell were the most accomplished diagnostician or the most brilliant surgeon in the country. On the other hand, we all know of medical men who are distinguished neither by good breeding nor by thorough training and yet have an enormous following among the laity. Such men are naturally gifted psychologists and for that very reason are capable of doing a great deal of good. Of course, such things cannot so much be taught as they are learned by experience and adaptability. The somewhat vulgar term "good mixer" applies as well to the physician who knows how to accommodate himself to the various types of people he meets professionally. While it is hardly possible to give in bare words instructions regarding that indefinable something that makes up the confidence-inspiring personality of the true physician, a certain assurance and earnestness coupled with humane sympathy cannot fail to make an impression. It is important to manifest interest in the complaints of the patients and to listen indulgently to their stories. It is easy enough to lead the patient who loses herself in non-essentials back to the point by a skillful question without creating the impression of brusqueness or indifference. Cleanliness and good taste in furnishing the waiting and consultation rooms are contributory factors which should not be underestimated.

A really exhaustive examination creates the impression of conscientiousness and thoroughness and gains the confidence of the patient—and this, let it be repeated, is the indispensable premise for any successful psychotherapy; for by means of psychotherapy we strive to exert upon the patient a therapeutic effect *largely* by mental impression, and by other procedures and remedies *only* in so far as they intensify the psychic influence.

Psychotherapy or—to use a more popular term—suggestion, has to many a taste of charlatanism. If the charlatan, the Christian Scientist, and that ilk make use of it, should the medical profession voluntarily forego the benefits of a sound therapeutic principle merely because ignorant or shady "irregulars" have employed it? I wonder how many practitioners who ease the pain of a swollen limb by a moist compress know that they owe this remedy to a simple Austrian shepherd—Vincent Priessnitz was his name—way back in the eighteenth century.

Suggestion, we hear it stoutly affirmed, is a deceit; it is applicable only to hysterical people who deceive themselves or are trying to deceive others; at best, its effect lasts but a short time. All of these assertions are false. In order to understand psychotherapy we must free ourselves from the fetters of the word "imagination." We used to call imaginary or hysterical whatever we could not explain, and I feel that many times we have done our

patients a great injustice. After twenty years, I still remember vividly a young woman with multiple and apparently groundless symptoms, which, to my diagnostic inexperience, appeared to be hysterical; but when I finally operated on her after much urging on her part, I found the abdomen filled with adhesions! The other extreme, that of treating accidental and unimportant gynecologic alterations locally or surgically in order to cure an existing neurosis or hysteria is equally to be eschewed. The proper attitude is to subject such a nervous person to gynecologic treatment *only* if it is also strictly indicated in a non-nervous patient.

Let us now assume that, after an exhaustive history and a most painstaking examination, we have come to the conclusion that the organs are healthy and that the symptoms complained of are produced merely by psychic factors. The best way, then, to relieve such patients of their complaints is to explain matters, to allay their apprehension, to lead psychic conceptions gradually into more normal channels. Just how to do that in a given case depends on the patient and even more on the personality of the physician. A certain degree of intelligence, of course, is necessary so that the patient can comprehend and follow the suggestions of the physician. I have, for example, likened the situation to a power house where the slightest temporary disarrangement of the machinery, too much or too little oil, a slight wearing of a cog, the retarding of the spark, or the like, may cause a flickering of the electric bulbs in homes miles away. In like manner may, independently of the will, a momentary disturbance in the central nervous system produce symptoms of disease in remote parts of the body. This does not mean a disease of the brain. Rather does it mean a fleeting action of the brain cells due to over- or understimulation; and when this is fully appreciated by the patient, pain and other symptoms usually disappear. For the conception of disease, the physician by *direct* or verbal suggestion substitutes the conception of improvement and cure. This does not necessarily exclude the *indirect* suggestion by means of medicine, diet, climatic cures and changes of environment, hydrotherapy, and electricity. Massage and gymnastics, too, deserve attention. Systematic exercises, for instance, not only result in a physiologic strengthening of the exercised muscles, but they also increase self-confidence and satisfaction with the physical work done, and thus the will power as well as the physical strength is intensified.

This combination of direct and indirect suggestion is well exemplified in the treatment of vaginismus. The condition occurs most frequently in newly married women as the result of painful traumatisms of the hymen in the course of unsuccessful attempts at coition. The traumatisms will produce a reflex spasm of the entire musculature of the pelvic floor which render the immission of the penis impossible. After they have healed and the actual pain has subsided, the *fear of pain* often remains, and this purely psychic process perpetuates the muscular spasm at every new attempt at intercourse, as discussed more fully on page 266. The direct suggestion consists of a complete explanation of the origin of the disturbance. For the indirect suggestion, the patient is asked to bear down as if at stool and as the vaginal entrance necessarily relaxes during straining, a well lubricated uterine dilator is quickly

introduced. This procedure is now repeated with ever larger sizes as described in a previous chapter. Each time the patient bears down, it is demonstrated to her that her fear is groundless and that very large dilators and even bivalve specula can be introduced into her vagina without giving rise to pain. After this experience, the patient will heed the physician's statement that the abnormal cramp will not return and that intercourse will take place without difficulty.

A still more potent form of psychotherapy is hypnosis. I have had no personal experience with this method of treatment and I believe that it had best be reserved to the psychiatric specialist. From the study of the literature I have not received the impression that hypnosis should become the common property of the general practitioners.

In closing, I wish to quote Walthard who claims that the following psychoneurotic genital symptoms can be cured without any local treatment: vaginismus, anal and vesical cramps, the psychoneurotic clonus of the oblique and recti muscles, the psychoneurotic hypersecretion of the uterine and Bartholin glands, certain forms of pain in the anterior abdominal wall, the coccyx, the pudendal and ileo-inguinal nerve, psychoneurotic hyperesthesias of the vulva, etc.

The number of patients who consult the gynecologist for psychoneurotic genital symptoms amounts to about 4 per cent in the clinic and to considerably more among the educated classes. (Walthard.)

The practitioner who attends to gynecologic cases should, therefore, pay attention to psychotherapy and endeavor to acquire proficiency in this form of treatment. The appended bibliography may be of service to him in studying the matter in greater detail.

LITERATURE

DUBOIS. The Psychic Treatment of Nervous Disorders, Engl. Trans., Funk and Wagnalls, New York and London, 1900.

FREUD. A General Introduction to Psychoanalysis, Boni and Liveright, New York, 1920.

LIEGNER. Zentralbl. f. Gynäk., 1922, 46: 89.

MUELLER. In Therap. Technik für die ärztl. Praxis, ed. by J. Schwalbe, Leipzig, 1921, 1041.

OPITZ. In Menge-Opitz: Handb. d. Frauenheilkunde, Wiesbaden, 1913, 260.

STEWART and FAIRBAIRN. Obstetrics and Gynecology, by J. S. Fairbairn, London, 1921, 725.

WALTHARD. In Handb. d. Frauenheilk., by Menge and Opitz, Wiesbaden, 1913, 189.

WESTPHAL. München. med. Wchnschr., 1922, 69: 537.

CHAPTER XXII

PROTEIN THERAPY

It has long been known and may daily be observed anew that some individuals are resistant to infectious diseases while others are not. Of two seemingly equally strong individuals, the one may die, the other may recover from the same infection. The work of biologists and physicians, beginning with Koch and Pasteur and representing such famous names as Metchnikoff, Roux, Dieudonné, Wright, von Behring, Ehrlich, Fränkel, and Flexner, established, within the last twenty years, the teaching of natural and acquired immunity and led to the development of a *specific* immunizing or curative therapy (vaccines, serum, salvarsan, etc.). What a blessing this specific therapy has been to mankind is difficult to express in words.

Still more recent, too recent in fact to be taught in medical schools, is another advance in therapeutics, namely, the recognition that many infectious diseases can be cured by the introduction into the body of *non-specific* protein substances, that is to say, by substances which, unlike the remedial agents of specific therapy, have no relation whatever to the infection under treatment.

To give but a few examples, diphtheria antitoxin was used with success in sepsis, tuberculosis, lupus, sarcoma, etc.; the serum of horses immunized with yeast cells was effectual in certain eye diseases; arthritis deformans and other forms of arthritis were cured or ameliorated by typhoid vaccine, antimeningococcus serum, etc. Asthma, neuritis, and a host of other diseases of bacterial origin have been relieved in this non-specific manner.

The study of this latest phase of medical achievement is fascinating; it encourages biologic reasoning in medical practice, and opens up promising possibilities along new avenues of thought. As the scope of this book does not permit of further details regarding this interesting matter, the reader is referred to a recent book by Petersen (see bibliography) which, in a very attractive manner, covers all aspects of the question. Its completeness may be gauged by the fact that the bibliographic references cover no less than 52 pages.

Very briefly stated, it has been established by observations made in almost all fields of practical medicine and by animal experimentation as well, that protein substances introduced "parenterally," that is, by subcutaneous, intramuscular, or intravenous injection, have the faculty of stimulating the cells of the body to greater activity—of "activating the protoplasm." All cells of the body feel this rejuvenating influence, but none more so than those cells which have been weakened or paralyzed by infection. These cells seem to obtain a new lease on life; some of their normal vigor returns and their

natural means of defense becomes reassembled. Let us not forget that, after all, the most powerful efforts of throwing off an infection are those exhibited by the affected cells themselves. If the infection is too strong, the cells succumb, but under the stimulus of foreign protein injections they awaken to renew the struggle against the invading microbes. The protoplasm again develops phagocytic properties, the toxins are neutralized by a fresh production of antibodies, and ferments, the local metabolism is intensified, and the pus is absorbed. Under favorable circumstances, the infected organ or tissue may thus rid itself of its enemy, and more or less normal conditions may be reëstablished.

If we apply this conception of the action of protein therapy to pelvic infections in general, and in particular to gonorrheal salpingitis which forms the greater part of such infections, we can imagine that the inflamed and swollen, and even the occluded and distended tube takes up an invisible warfare against the gonococci and their products and that, if all goes well, the tube may emerge victorious from the struggle, with the gonococci destroyed, the pus absorbed, and the tissues of the tube normal or fairly normal in size and softness. It stands to reason that only those cells can take up the fight for existence with any prospect of success that have not been hopelessly and permanently damaged and, as a matter of fact, practical experience has shown that foreign protein therapy gives a promise of cure largely in subacute and early chronic cases of salpingitis and pyosalpinx and is apt to fail in cases of very long standing.

This description of what goes on in the depth of the pelvis may be crude and anthropomorphic, but it will serve to visualize and simplify the intricate and complicated biochemical and morphological changes within cells which are defending themselves against a bacterial poison.

While this struggle goes on beyond the reach of our eyes, there are enough indications and outward manifestations to the effect that these protein injections have made themselves felt. In most cases there are chills and fever soon after the injections, or the patient may have nausea or headache, or feel a general malaise. We call this the "general reaction" and we distinguish it from the "local" or "focal" reaction which occurs in the affected part itself and consists of a transitory increase of local pain and occasionally a brief increase in the size of the inflammatory tumors.

A large number of various proteins has been recommended and used to advantage. From the extensive list given by Peterson I select a few, merely for the sake of illustration: normal blood (human, horse, sheep, beef, goat, chicken, etc.) and immune sera (antistreptococcus, antimeningococcus, human convalescent, etc.); antitoxins (diphtheria, tetanus); cerebrospinal and pleural fluid; egg albumin and seralbumin; milk; casein; nucleoprotein; peptone; leukocytic extract; extracts of tissues (cartilage, etc.) and of endocrine glands; vaccines of all kinds; tuberculin; Coley's fluid, and a good many others.

At present, a great deal of interest is manifested in the treatment with milk which was introduced into medical practice by Robert Schmidt, of Prague, in 1916. The results obtained in the treatment of certain internal diseases,

eye infections, and joint troubles have been startling, and the gynecologic experiences have likewise been highly favorable.

Lindig has tried to standardize the milk treatment by using purified casein, and various writers recommend other preparations of casein with the trade names of "aolan" and "caseosan," respectively. I have used "aolan" occasionally, but my personal experiences were gained chiefly with milk which I prefer because it is easily obtainable. What I have to say about my own results refers, then, to the milk therapy proper.

The technic of the milk treatment is exceedingly simple. Ordinary whole milk is sterilized, either by boiling or by pasteurization at 80° C. for one hour on six successive days. The boiling method of sterilization is handier for the practitioner who has no access to a reliable laboratory. A previously boiled test tube is filled with 10 c.c. of milk and then boiled for ten minutes in a water bath in such a way that the test tube does not touch the bottom of the vessel. It is then poured into a sterile medicine glass and drawn up into a sterile syringe. By this time it is cool enough to be used. Five c.c. of this milk are injected into the gluteal musculature (or into other muscles—arm, back, etc.), and the injections are repeated at intervals of from three to five days. The stronger the reaction, the longer the interval within this limit. The amount injected is gradually increased to 10 c.c., which is usually reached by the third injection. The average number of injections in my cases was eight; one patient received as many as twelve; a few others had only four injections. If a thin and sharp needle is used, the injections are not painful although the bulk of the fluid injected may cause a momentary discomfort. There are no sensitive infiltrations to be expected, as after mercury injections.

A culture made of milk thus prepared remained sterile; one of my friends, however, tells me that he regularly obtained a luxuriant growth of microbes. Yet in none of my injections was there any vestige of infection nor to my knowledge has a single case of abscess formation been reported in the many thousands of cases published in the literature.

The general reaction occurred, as a rule, from six to eight hours after the treatment. In about half the cases there was a chill followed by a rise in temperature. Only twice did the fever reach 104° F. (40° C.) or over; in the majority of the cases the temperature was between 100° and 102° F. and in some it differed very little, if at all, from the normal. A few patients also had nausea, headache, or a feeling of drowsiness; in one or two cases there was a somewhat profuse perspiration. These signs of a general reaction appeared only in the beginning of the treatment. After the second or third injection there was, as a rule, no further disturbance of any kind. It is stated by several writers that the initial intensity of this general reaction seems to have a bearing upon the ultimate outcome. This does not quite correspond with my experience; in one case, for instance, where the final result has been particularly gratifying, it was absent altogether. Even where there has been a general reaction, this hardly lasts longer than a day. After that, the patients feel markedly improved; they look better and their appetites improve. Blood examinations have shown me that the white count reaches a moderate degree of hyperleukocytosis on the day following the injection, decreases on the

second, and returns to the normal on the third day. An anaphylactic shock has never occurred in my cases nor need it be anticipated. Among the many thousands of injections reported but very few cases of shock have occurred. Peterson remarks very aptly that in these few cases part of the injections may accidentally have reached a vein. Great care, therefore, should always be exercised that the injections are intramuscular. I make it a point to test before injection whether the needle has punctured a vessel.

I can do no better than to quote verbatim from a paper which I published in August, 1922:

"Two of my patients exhibited a marked local reaction. They felt 'worse off than before' and, on examination, their tubal tumors seemed a trifle larger. After two and three injections, respectively, these patients, like all the rest, stated that they had less pain in the abdomen. Only one patient required four injections before the abdominal pain subsided entirely.

"With the exception of three who came to the clinic, all patients were treated in the hospital, either because they were too sick to be about or because I wanted better facilities for careful study. Most of these hospital patients were discharged as soon as feasible and received the rest of their injections in the office or clinic.

"What interests us most is the question of results. In all, thirteen patients were treated with milk injections. Of these, ten had a frank gonorrhea as evidenced by the finding of gonococci in the cervical secretion. All had signs of a subacute or chronic pelvic peritonitis with thickened and painful tubes. Of these ten gonorrheal patients, six have been cured completely and have returned to their various occupations. Their recovery dates back from two to four months. They have passed through normal menstruations without a flaring up of their former trouble. The best results were obtained in two women who were still in the subacute stage of the infection. They had pyosalpinx sacs of the size of a fist, and a vaginal incision and drainage of the large fluctuating tumors which bulged into the culdesac, seemed almost inevitable. The customary treatment of rest in bed, ice-bags, regulation of the bowels, etc., had given them no relief. In both these cases the tumors disappeared completely after eight and eleven injections, respectively. Two women are greatly improved both subjectively and objectively but, as they are still under treatment, definite judgment must be reserved. In two patients, finally, there was an improvement of the general condition but locally they were unimproved.

"Aside from these ten gonorrheal patients, three patients had milk injections, each for a different and very interesting condition. The first had an enormous abscess following the perforation of the puerperal uterus with a curet. The tumor filled half of the pelvis and extended upward to the level of the anterior superior spine. Fever, peritonitic symptoms, and fluctuation urgently suggested incision and drainage; yet, after only five injections of milk, this large tumor vanished entirely and the patient has been enjoying the best of health for more than two months.

"The second patient was a woman with a pelvic tumor of obscure origin.

She had a severe cystitis, and with each micturition large quantities of air escaped from the bladder. The cause of this phenomenon could not be ascertained. Her very poor general condition permitted of no exploratory operation, and she was given milk injections to build up her general resistance. The result was very satisfactory; the cystitis improved markedly and the escape of air ceased. This patient will be operated on in the near future.[1]

"The third patient presented herself with an inoperable cancer of the cervix and received radium treatment. The subsequent shrinkage of the tumor masses and the formation of cicatricial tissue obliterated the cervical canal and there ensued a pyometra which within a few weeks extended as high as the umbilicus. I tried to open up and drain the uterine cavity but the dense mass of scar tissue defied my attempts. I then put the patient on the milk treatment merely in the hope of ameliorating her desolate general condition, and I was amazed and delighted to see a continuous decrease in the size of the uterus. The uterine tumor was only half its former size after the seventh injection, and to-day, after the twelfth injection, the uterus is only slightly larger than a normal uterus. Besides, the patient has gained in weight and strength and to the casual observer gives the impression of perfect health.[2]

"A few pleasant by-effects were noted in the course of treatment in three patients. In one, a badly infected vaccination healed very promptly. In another, a severe gonorrheal monarthritis in the ankle joint which had resisted all previous modes of treatment, subsided within four weeks and the patient has regained the full use of her foot. The third patient had an ankylosis of the knee joint as a result of a gonorrheal arthritis. There is now a limited mobility in the joint and the patient claims that the improvement is making distinct progress." [3]

Since the publication of this paper I have added considerably to the number of cases and my favorable impression of the therapy has been confirmed in almost every case. For example, a case of recurrent gonorrheal pelvic peritonitis with hyperpyrexia and hyperleukocytosis and with greatly distended abdomen and intense pain, returned to normal after four injections, though there had been no general reaction at any time.

It seems to me that not all parts of the genital tract respond equally well to the milk injections or, to judge from the literature, to any other form of protein therapy. The tubes, the uterus, and possibly the bladder are favorably influenced while the ovaries seem to remain refractory. Exudates are brought to absorption, but adhesions are left undisturbed. Gonorrheal infection of the cervix remains unaffected by the treatment. The cervix, therefore, must be treated separately for the sake of preventing reinfection.

I may add, in passing, that I have seen some very striking results in puerperal infections of milder degree where the injections of milk were followed promptly by recovery.

In the last three or four years, German clinicians have written extensively

[1] She refused operation later because she felt completely restored.
[2] Death from cancer occurred suddenly, about two months after the above was written.
[3] No later data obtainable, as patient has left the city.

on the use of turpentine in genital infections. It is of historical interest that this treatment is an unconscious revival of the "fixation abscess" by which, in the early nineties, Fochier, of France, through the subcutaneous injection of turpentine, meant to "create artificially a focus of suppuration which, while itself easily accessible to treatment, would fix at this one point the (puerperal) septicemia of the entire organism."

The method has largely been abandoned, even in France, and is referred to only very occasionally. (Cotret.)

The newer application in the field of gynecology was conceived of by Klingmueller in 1918, probably independently of Fochier. The method, as now applied, consists in the intramuscular injection of ¼ c.c. of a 20 per cent solution of rectified turpentine oil in olive oil at intervals of three days. More recently a preparation called "Terpichin" is recommended which contains also 15 per cent anesthesin. The results obtained in the treatment of pelvic infections are very similar to those after milk injections and are obviously based upon the same explanation. By the turpentine injections a sterile inflammation is produced; body cells are destroyed; the cell débris together with the extravasated leukocytes are reabsorbed; and, while originally autogenous, they are now foreign protein and act as such. There is a close analogy between this mode of action and the effect of re-injection of milk of lactating mothers for the purpose of stimulating the mammary glands.

The last word has not yet been spoken on the subject of protein therapy. The matter is still too new to permit of a final appraisal. Enthusiastic, almost unqualified claims are counterbalanced by the report of failures or indifferent results. This should not be surprising, for where there is a remedy that will prove successful in all cases? This much is certain, that protein therapy represents a real advance in our conception of the reparative processes in the infected organism and the conservative treatment of certain gynecologic affections. But much is still to be done. The question of dosage, for instance, will have to be worked out. Certain forms of infection may respond better to one or another protein; the difference in response may be found to change in various stages of the same disease. A combination of specific with non-specific proteins may at times be advisable. The general state of the patient and her ability to bear the added strain of the protein reaction must be considered. Therapeutic results cannot be expected when the organism is no longer capable of response to stimulation. When complete fatigue has been reached, no amount of stimulation will avail and the additional burden imposed by the material injected can only harm the patient.

In short, "non-specific therapy does require judgment, careful attention, and bedside study on the part of the physician, perhaps in greater measure than any other therapeutic procedure. It should never be routine; to be useful it must be an individualized therapy with dosage and preparation and time of application varied to the disease, its intensity, its duration, and the resistance of the patient. So used, non-specific therapy should prove to be one of our most useful measures both in acute infectious diseases and chronic inflammatory lesions." (Petersen.)

LITERATURE

GELLHORN. Journ. Missouri State Med. Assoc., 1922, 19: 341.
HARTOG. Tr. German Gyn. Society, 1920, 151.
PETERSEN. Protein Therapy and Nonspecific Resistance, The Macmillan Co., N. Y., 1922 (extensive bibliography).
RENÉ DE COTRET. Suites des Couches Normales et Pathologiques, Montreal, 1919, 350.
SONNENFELD. Zentralbl. f. Gynäk., 1920, 45: 686.

CHAPTER XXIII

POWDER TREATMENT

Powders are used to advantage in the treatment of leukorrhea. Kelly recommends in rebellious cases of gonorrhea the use of iodoform powder dusted on dry, elastic, non-absorbent cotton tampons so placed as to balloon out the vagina moderately, thus removing the folds from its mucous membrane. The packing should be done with the patient in the Sims or the knee-chest position and repeated every third day, the patient removing the tampons on the night of the second day and taking a douche of permanganate of potassium, 1:1500.

Anspach incloses a powder *within* a vaginal tampon of absorbent cotton and lamb's wool and finds equal parts of powdered burnt alum, boric acid, and bismuth subnitrate, or equal parts of tannic acid and lycopodium most satisfactory for astringent purposes.

Crossen, after treating the cervical canal and the vaginal vaults with an antiseptic, throws a large quantity of a powder composed of tannic acid (1 part), xeroform (1 part), and boric acid (3 parts) into the upper part of the vagina by means of a Politzer bag. The powder is held in place by tampons which are removed after one or two days; the treatment is then repeated, subsequent to a thorough cleansing of the vagina.

Bandler introduces powder into the vagina through a tubular speculum by means of an ordinary powder blower. As the speculum is slowly withdrawn, every bit of the exposed cervix and vaginal walls is covered with powder in succession.

Of the use of powdered yeast I have spoken elsewhere.

For the palliative treatment of the discharge of inoperable cancer of the cervix, Berczeller suggests the use of sugar. The tubular speculum in which the cervix is exposed and dried, is filled half or more with finely powdered, granulated sugar which is pushed inward and held in place with a strip of iodoform gauze. This treatment is repeated daily at first, later at longer intervals. From personal experience I can confirm the prompt effect. Usually after the second treatment the gauze remains clean, and discharge and odor are reduced almost at once. I have used this treatment both after radium treatment, until the radium began to exert its influence, and prior to operations.

Probably the most important contribution to the question of powder treatment was made by Nassauer. This author, in 1909, called attention to the impossibility of cleansing the infected vaginal mucosa by means of douches. Neither watery solutions nor bactericidal drugs suspended in cocoa butter, glycerin, etc., can enter into all the folds and crevices of the mucosa and destroy the microbes. Tamponade with iodoform or other antiseptic gauze

would, theoretically, be more promising, but for practical purposes the procedure is too painful and injurious to the delicate and inflamed epithelium. A thorough drying out of the vagina with powder, on the other hand, would not only envelop the bacteria, deprive them of the moisture necessary for their existence and thus render them harmless, but it would also absorb the discharge and thereby give immediate subjective relief. He selected for his treatment *bolus alba* or *kaolin* which is very fine, in itself indifferent, and highly hygroscopic. It may be impregnated with astringents or antiseptics such as aluminum acetate (20 per cent) or silver nitrate (2 per cent), powdered ichthyol, iodin, tar, etc. Light-complexioned women need weaker concentrations than brunettes. In order to apply the powder to all parts of the mucosa, the vagina must be distended *ad maximum* at the same time, and this is accomplished by a very simple appliance which he calls "Siccator" (Fig. 141).

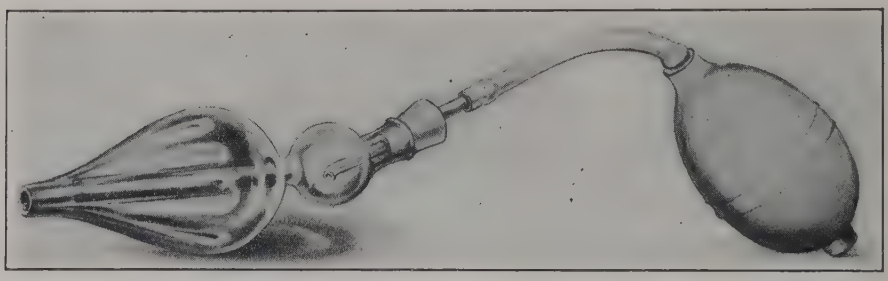


FIG. 141.—NASSAUER'S "SICCATOR," A VERY PRACTICAL POWDER BLOWER WHICH MAY BE USED BY THE PATIENT HERSELF IN THE TREATMENT OF LEUKORRHEA.

A pear-shaped bulb of glass is thinned out conically at one end. Introduced into the vagina, the bulb completely closes the vaginal entrance no matter how wide it is. A canal in the long axis of the bulb communicates with a small glass reservoir which is connected at its other end with a rubber tube and bulb. The reservoir is filled with bolus alba and securely closed with the stopper. The glass bulb is now introduced into the vagina and held firmly against the introitus, and at the same time the rubber bulb is compressed with the other hand three or four times in succession. The air pressure suffices completely to unfold the vagina and simultaneously to distribute the powder over the entire mucosa. When this distention has reached its maximum degree, the air escapes along the four grooves upon the outer surface of the glass bulb. The manipulation may now be repeated until all the powder has been deposited in the vagina. At the end of each treatment, the vulva is dusted with the same powder.

The treatment is given daily, later every other day, by the physician, or the patient can easily learn to use the instrument herself. Every three or four days, the creamy discharge which has accumulated in the vagina is wiped out in the speculum, or a cleansing douche with camomile tea or a weak bicarbonate of soda solution is made. This cleansing douche is superfluous if equal parts of kaolin and bicarbonate of soda are used. The length of treatment varies according to the underlying etiology—from two or three applications in simple vaginitis to four or more weeks in gonorrhea.

Nassauer recommends this method in leukorrhea of whatever etiology. Of course, it is merely a symptomatic treatment. Nevertheless, it is of great temporary value until the underlying cause in the individual case has been removed, for instance, constitutional causes, polyps, cancers, etc. Nassauer claims, however, that his method has a direct curative effect upon the most frequent cause of leukorrhea, namely, bacterial infection. The powder not only restrains the microbes present in the vagina but by its hygroscopic action attracts those in the upper layers of the mucosa and mummifies them. As the acrid purulent discharge is neutralized by the bolus alba, secondary irritation of the various mucous surfaces is prevented and the discomfort of the patient relieved.

From an extensive personal experience I can confirm many of Nassauer's claims. In the acute stage of gonorrhea it is to my mind the only available form of local treatment. In later stages of gonorrhea and with other causes of vaginal discharge it yields very satisfactory results if combined with other modes of treatment. On the whole, the powder treatment, particularly the method of Nassauer, deserves the earnest attention of the profession.

LITERATURE

Anspach. Gynecology, 1921, 709.
Bandler. Medical Gynecology, ed. 3, 1914, 69.
Berczeller. Zentralbl. f. Gynäk., 1913, 37: 852.
Crossen. Diseases of Women, ed. 5, 1922, 265.
Kelly. Medical Gynecology, 1908, 371.
Nassauer. München. med. Wchnschr., 1909, No. 15; ibid., 1912, 59: Nos. 10 and 11; ibid., 1916, 62: 272.

CHAPTER XXIV

RADIATION THERAPY IN GYNECOLOGIC DISEASES

HENRY SCHMITZ, A.M., M.D., LL.D., F.A.C.S., Chicago, Illinois.

The principles of radiation therapy comprise a knowledge of (1) the laws of the physics and the biology of rays; (2) the action of the rays on the living cells and body; and (3) the technic of the therapeutic application of the rays in the indicated diseases.

Radiation therapy is still in a developmental period. The combined labors of the physicist and the physician, however, have revolutionized the technic of application. At first an empirical therapy, it has been rapidly placed on an exact and scientific basis.

The subject matter will be considered under the following subdivisions:

The physics.
The measurement of the intensity of the rays.
Needles and Emanation.
The biologic unit and the determination of the radiation dose.
The action of the rays on the living cell and the constitutional reaction.
The treatment of the "radiation sickness."
The treatment of the skin injuries.
The radiation treatment of diseases of women.

THE PHYSICS

A beam of rays sent into the human body suffers quite a considerable depreciation of its intensity, due to the diffusion with an increase in distance from the point source and the absorption of the rays.

If the source of the rays is a point, then the intensity of a beam of rays falls off as the inverse square of the distance from the point source. If, at a given distance from the focus or target of the X-ray tube, a quantity of rays strikes a surface of 1 cm. square and if we arbitrarily place this intensity at 100 per cent, then at twice the distance from the anticathode the same beam of rays is spread over a surface of 4 cm. square and the intensity is 25 per cent, at thrice the distance the beam strikes a surface of 9 cm. square and the intensity is 11.1 per cent, and so on.

The absorption of rays comprises the sum of all transformations of X-ray energy by which the primary rays are changed to other rays or energies, as the production of heat, chemical processes and electrical reactions. The most important of these transformations of energy are the formation of secondary rays, namely, (*a*) scattered rays, (*b*) characteristic or fluorescent rays, and

(*c*) corpuscular rays. Mayer [1] and Keetmann [2] have investigated the degree of absorption. The decrease of intensity due to absorption has been placed at about one tenth of the energy remaining at each centimeter of tissue traversed. Absorption is of great importance. The degree of absorption is one of the most important factors in the biologic effect on the cells and the constitutional reaction of the patient.

X-rays and gamma rays of radium and mesothorium travel in straight lines. Part of the rays when penetrating through substances in their path strike atoms and are thrown out of their straight path, that is, they are *scattered*. The scattered rays differ from the primary rays only by their deviated course. Compton [3] and Crowther,[4] however, observed that the scattered rays are softer than the producing primary rays. Friedrich [5] was the first to call attention to the importance of scattered rays in radiation therapy. The smaller the port of entry, the smaller is the percentage of the secondary scattered rays; and the deeper the rays advance, the larger will be the percentage of secondary scattered rays. Friedrich found that the secondary scattered radiation from X-rays contributes from 75 to 85 per cent of the total intensity of an X-ray beam produced with known factors remaining at the depth of 10 cm. in a water phantom. Friedrich and Glasser [6] investigated the scattering of gamma rays which may amount to as much as 300 per cent of the total radiation in a depth of 10 cm. in a water phantom, depending on the amount of radium and its distribution in capsules.

If we pass rays of different but gradually increasing hardnesses through an absorbing material, then the degree of absorption decreases with a proportional increase in the hardness of the rays. Each substance traversed by rays of a gradually increasing hardness will show a sudden increase in absorption. This has been termed "selective absorption." At the same time the absorbing substance emits a considerable amount of secondary rays, which are always much softer than the activating primary rays. This increased absorption occurs only at a given wave-length characteristic for the absorbing substance. The secondary radiation emitted from the latter is termed *characteristic or fluorescent radiation*. Each element has its own characteristic radiation, which is dependent only on the atomic number of the element. The higher the atomic number, the shorter will be the wave-length of the characteristic radiation. The latter has also been termed *fluorescent* as it is produced by the absorption of energy of shorter wave-length.

The elements comprising the human body have low atomic numbers. The characteristic radiation produced is very soft and is absorbed in the immediate neighborhood of its origin. However, if filters of high atomic weights, such as copper, zinc, tin, gold, are used, then the characteristic rays produced must be considered. They are of such a short wave-length that they may cause undesirable biologic actions in the skin unless they are arrested. The interposition of an aluminum filter will accomplish this.

The therapeutic value of characteristic radiations has been investigated. Solutions of salts of heavy metals, such as potassium, silver, copper, and so forth, can be deposited in the tumor area. When using such radiators, the proper quality of radiation must be produced to excite the characteristic radia-

tion peculiar to them and thus increase the total radiation within the tumor area. Otherwise such a procedure would be useless. Barkla and Sadler [7] studied the physical aspects of the characteristic rays, while Friedrich and Bender [8] investigated their therapeutic value. The latter conclude that: (1) A pronounced secondary characteristic radiation is excited in the secondary radiators within the range of wave-lengths of the X-rays employed. (2) The influence of the characteristic rays from secondary radiations on the dose obtained in the biologic object is negligible. A diminution in the intensity in the tissue area beneath the radiator occurs in a greater number of the cases through absorption of primary and scattered rays by the radiator. (3) The action of the secondary radiator in solution depends on the concentration of the solution. It is greatest in the relatively weak solutions. (4) The size of the radiation beam is of influence on the action of the secondary radiator. The action is more marked in small than in large fields due to the small amount of scattered rays in the small field. (5) The production of characteristic rays in secondary radiators is, therefore, of doubtful value in therapy with the hardnesses of rays at present at our command.

Wintz,[9] however, resorts to a preradiation "copperization" of the diseased area. A sponge electrode saturated with a 5 per cent copper solution is placed against the cervix, and an indifferent cathode on the abdominal wall. A weak galvanic current of 20 m. amp. is then applied for four hours. He claims that by this process the radiation dose at the seat of the disease is increased by about 30 to 40 per cent. However, Friedrich and Bender's scientific investigation seems to disprove this contention.

If X-rays or gamma rays become absorbed, they give rise to another secondary radiation—the *corpuscular rays*. These are negatively charged electrons. There is generally a more copious emission, mass for mass, from the elements of high atomic weight. The intensity of the corpuscular emission increases with the atomic weight. These electrons move about with a more or less high velocity. The corpuscular nature of this secondary radiation is the reason for the relatively rapid absorption. The corpuscular rays of known high velocity, derived from radio-active substances, are absorbed in a few millimeters of tissue, while secondary beta-rays excited by X-rays possess a still smaller penetrability. The biologic action of all kinds of rays must, finally, be attributed to such corpuscular rays, though their activity is so slight that they may be neglected in secondary radiation therapy.

Absorption causes a decrease of the absolute amount of the rays, while scattering produces a change in the distribution of the rays. The loss caused by absorption and scattering has been termed "the total absorption." Absorption is indicated by the factor $\bar{\mu}$, scattering by σ and total absorption by μ, hence $\mu = \bar{\mu} + \sigma$.

The loss by absorption is the greater, the deeper the rays advance. Scattered rays, on the other hand, are not lost. They do not contribute to a decrease, but increase the radiation intensity markedly—the more so, the deeper the rays travel. Therefore, scattered rays form an important part of the radiation beam traversing a body. They have the same biologic action as the primary rays. Hence it is necessary to use them to the fullest extent

The highest ideal of radiation therapy would be to produce a radiation beam in which the quotient between the deep and the surface intensities would approach the value 1. This "deep quotient" is the greater the harder the rays are, the larger the field of entrance is, the stronger the filtration, and the greater the focus skin distance. All of these factors contribute greatly to an increase in the total quantity of the primary and scattered rays and, on the other hand, they correspondingly decrease the loss due to absorption. However, factors of operation exist which render the application of the rays most economical. They must be determined by standardization of technic and actual experience.

The shorter the wave-length of the rays, the harder and the more penetrating are the rays. The larger the field of entrance, the greater will be the amount of scattered radiation. Proper filtration will arrest those rays which otherwise would be absorbed by the normal tissues lying between the diseased area and the skin surface and, incidentally, will improve the deep quotient. The increase in the focus skin distance will bring about homogeneity in quality and quantity of rays, as first propounded by Dessauer.[10] For instance, let us assume that we apply an X-ray beam to a focus skin distance of 25 cm. and that the intensity at the skin is 100 per cent. Then at 35 cm. the intensity would be $25^2 : 35^2 = 625 : 1225 = 0.51$, i.e., 51 per cent of the intensity remains at a depth of 10 cm. Again let us apply an X-ray beam at a focus skin distance of 50 cm. Then the intensity at 60 cm. would be $50^2 : 60^2 = 2500 : 3600 = 0.694$, i.e., 69.4 per cent. This calculation comprises only the decrease of the intensity due to the diffusion according to the law of distance. However, as the other factors, namely, absorption and scattering, are not changed, the attained deep doses will be in the same ratio as the calculated doses are. If, for instance, we would find 30 per cent as the depth dose measured with 25 cm. focus skin distance, the depth dose with 50 cm. focus skin distance would be 41 per cent, according to the equation $30\% : 41\% = 0.510 : 0.694$.

THE MEASUREMENT OF THE INTENSITY OF THE RAYS

The measurement of the intensity of the rays by physical methods is necessary for the determination of the total absorption of the rays, the deep quotient, and the radiation dose.

The absorption coefficient μ depends entirely on the kilovoltage and filtration; the deep quotient on kilovoltage, filtration, size of field and focus skin distance; and the therapeutic effect, that is the dose, on intensity times time.

We use the ionization method which consists of an electrometer, a conductor, and an ionization chamber. The method was advised by Villard in 1907, perfected by Szilard[11] in 1912, and modified by Friedrich[12] in 1914 (Fig. 142). We also employ an electroscope constructed by Bachem with which we can determine the total absorption factor μ, the proper filtration for all the hardnesses or wave-lengths of the rays, and also the skin dose (Fig. 143). With the electroscope we can obtain direct readings without the use of

the conducting cable, thus practically obviating the errors due to the undesirable radiation in the electrometer methods and the creeping into and leaking out from the insulation of the electric charge, namely, the dielectric error, and also defects in the insulation.

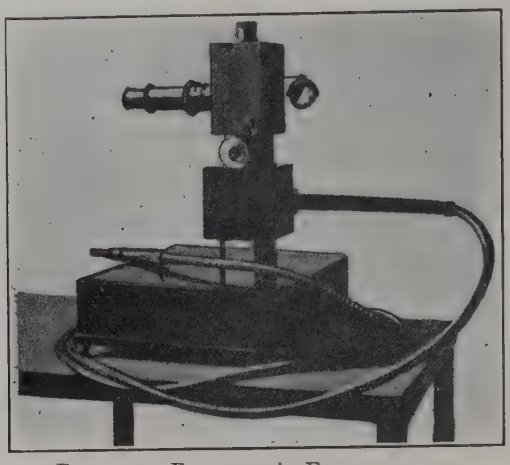


FIG. 142.—FRIEDRICH'S ELECTROSCOPE.

Fürstenau has constructed a very simple instrument (Fig. 144). It consists of a Wheatstone bridge. One of the systems is represented by a selenium cell. X-rays and gamma rays cause conductivity of an electric current through selenium. Therefore the deflection of a milliameter leaf is a measure

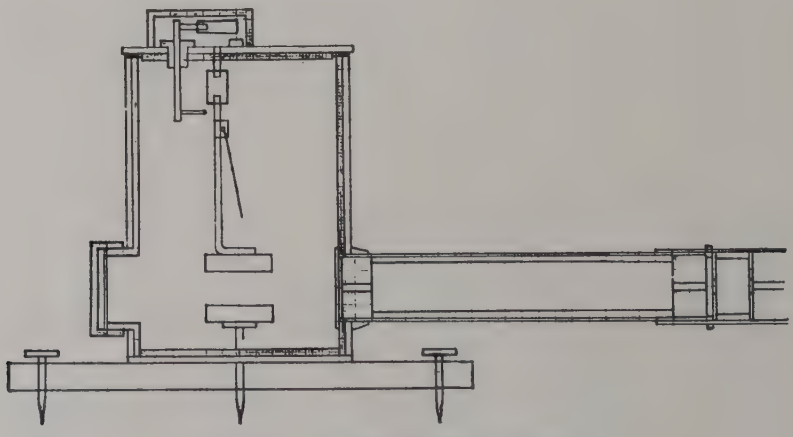


FIG. 143.—BACHEM'S ELECTROSCOPE.

of the intensity of rays expressed in "F" units per minute. To produce an E. S. D., a certain energy is necessary which depends on the voltage and filtering. For instance, using a 220 K.v. max. and a 1 mm. copper filter we multiply the time of deflection with 130.

To avoid the use of the human body as an experimental object we determined the intensities of the X-rays and gamma rays in a water phantom.

FIG. 144.—FÜRSTENAU'S INTENSIMETER.

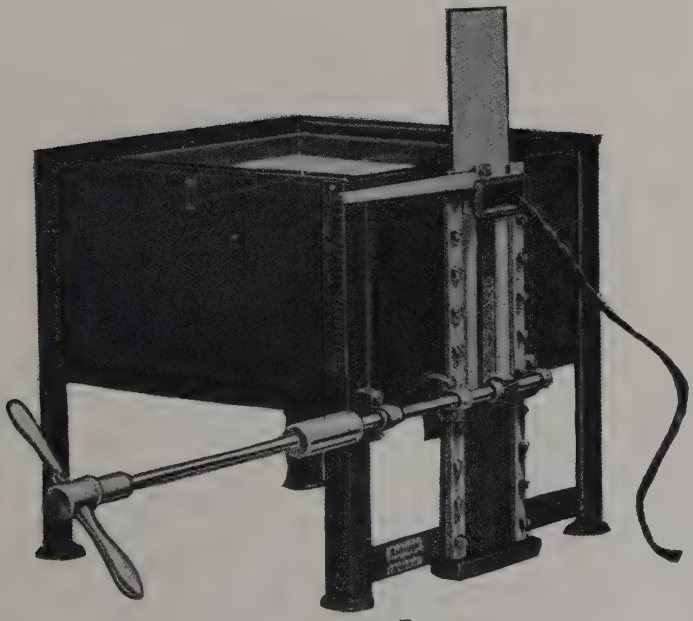


FIG. 145.—WATER PHANTOM.

Water absorbs about the same amount of rays as the soft tissues of the human body. A practical water phantom may be constructed of water-tight wooden boxes, each 25 cm. square and 5 and 10 cm. high. We must also construct two layers of paraffin or wood, each 25 cm. square, one with a thickness corresponding to the diameter of the ionization chamber, and the other with a thickness of one half the diameter of the ionization chamber. Fig. 145 shows a water phantom.

The water phantom is placed beneath the X-ray tube so that the center of the target strikes the center of the ionization chamber. The following factors for the production of the X-rays were used:

TABLE I

Kilovoltage, maximum	F. S. D.	Filter	Size of field	Mamp.	I_{10}
1. *a* 140	50	6 mm. Al	15×15	5	30
b 140	50	10 mm. Al	15×15	5	3
c 140	50	0.5 Cu and 1.0 Al	15×15	5	36
d 140	65	0.5 Cu and 1.0 Al	15×15	5	38
2. *a* 170	50	0.5 Cu and 1.0 Al	15×15	5	37
b 170	50	0.75 Cu and 1.0 Al	15×15	5	39
3. *a* 200	50	0.5 Cu and 1 mm. Al	15×15	5	38
b 200	50	0.75 Cu and 1 mm. Al	15×15	5	40
c 200	50	1.0 Cu and 1 mm. Al	15×15	5	42
4. *a* 230	50	0.75 Cu and 1 mm. Al	15×15	5	41
b 230	50	1.0 Cu and 1 mm. Al	15×15	5	44
c 230	50	1.25 Cu and 1 mm. Al	15×15	5	47

The electrometer is charged, the X-ray tube is activated, and the time taken with a stop watch within which the ionization of the air in the chamber by the rays causes a discharge of the charged electrometer. The ionization chamber is next placed at a depth of 10 cm. from the surface. The electrometer is again charged, the tube activated, and the time ascertained within which the electrometer is discharged.

Let us peruse a measurement of an X-ray with the factors given in Table I, 3 c. The intensities on the surface, that is, I_0 is 14.2 seconds; the intensities at 10 cm. deep, that is, I_{10} is 33.8 seconds. If we place I_0 arbitrarily at 100 per cent, then $I_{10} = \frac{14.2}{33.8} \cdot 100 = 42$ per cent. The logarithmic curve of these X-rays, which are practically homogeneous, forms a straight line. Hence if we know the logarithmic values of two points of the straight, we know the value at any point. The logarithm of 100 is 2.0 and that of 42 is 1.62. The logarithmic values are entered on coördinates. The abscissae present centimeters, and the ordinates the logarithmic values to the right and the percentage values of the intensities to the left. A line is drawn from log.

2.0 to log. 1.62. The natural numbers are read off at each centimeter. They represent the percentage value of intensities at each centimeter. We are now able to construct the absorption graphs seen in Fig. 146.

The intensities of gamma rays of radium were also obtained with the ionization method. The method and instrument of Friedrich and Glasser was used (Fig. 147). It consisted of a gold leaf electroscope, an ionization chamber of a capacity of 0.5 c.c., and a conductor constructed of brass tubing and an inner electrode of copper wire insulated with chemically pure powdered sulphur and amber supports at the ends.[13]

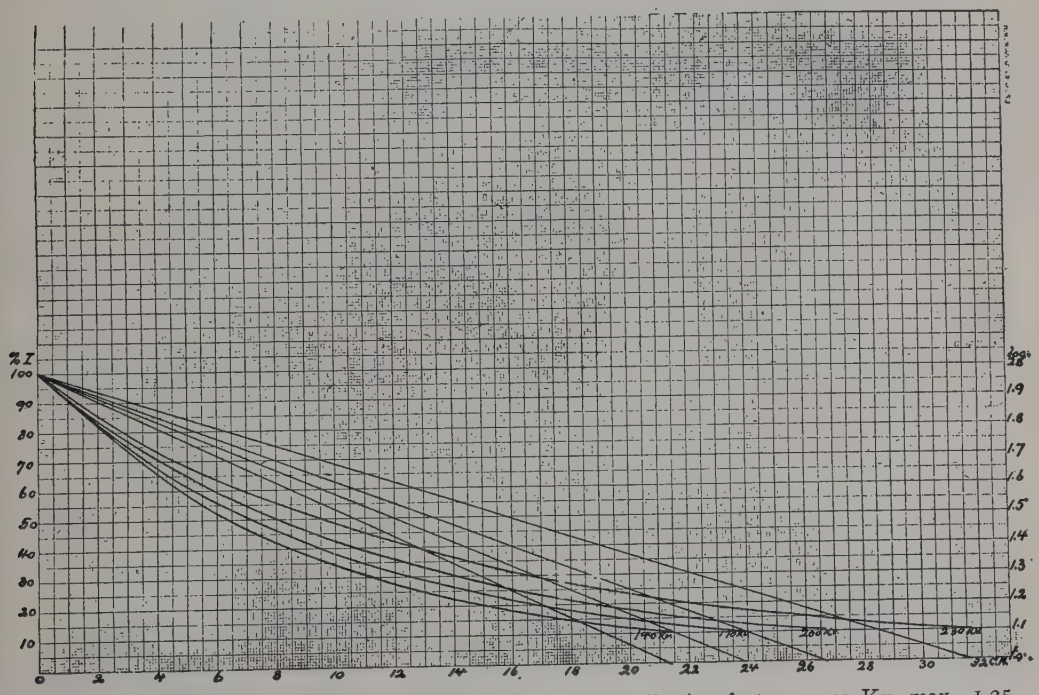


FIG. 146.—ABSORPTION GRAPHS OF X-RAYS. With the following factors: 230 Kv. max., 1.25 mm. copper and 1 mm. aluminum filters, 15 cm.^{2} port of entry and 50 cm. focus skin distance (F.S.D.); 200 Kv. max., 1 mm. copper and 1 mm. aluminum filters, 15 cm.^{2} port of entry and 50 cm. F.S.D.; 170 Kv. max., 0.75 mm. copper and 1 mm. aluminum filters, 15 cm.^{2} port of entry and 50 cm. F.S.D.; 140 Kv. max., 0.5 mm. copper and 1 mm. aluminum fibers, 15 cm.^{2} port of entry and 50 cm. F.S.D.

The intensity of the gamma rays depends on the following factors: the amount of radium element, the geometrical size and form of the capsules, the filtration, the distance, and whether the measurements are made in air or in water. In cervical carcinomata the capsules are inserted within the cervical canal, that is, intratumorally. Hence, we shall consider only the intensities measured in a water phantom. We placed two 25 milligram radium element capsules in a brass filter of a wall thickness of 1.5 mm., as seen in Fig. 148. The intensities were measured for each centimeter in the directions *a*, *b*, and *c* and corrected by the undesirable radiation. The values are seen in Table II. The values were plotted on coördinates (see Fig. 149). Finally the equal intensity curves called isodoses by Friedrich and Glasser were constructed

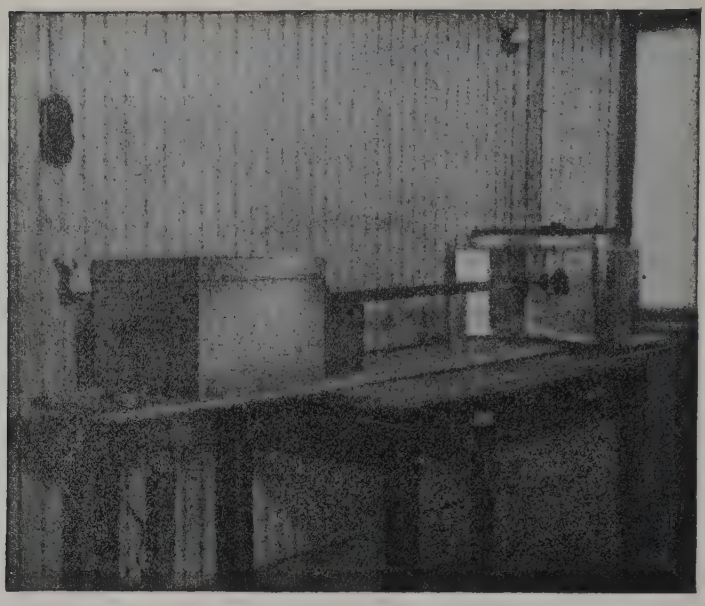


FIG. 147.—ELECTROSCOPE AND WATER PHANTOM OF FRIEDRICH AND GLASSER FOR THE MEASUREMENT OF RADIUM INTENSITIES (from Kroenig and Friedrich, Physics and Biology of Radiation Therapy, with permission of Rebman Co., New York).

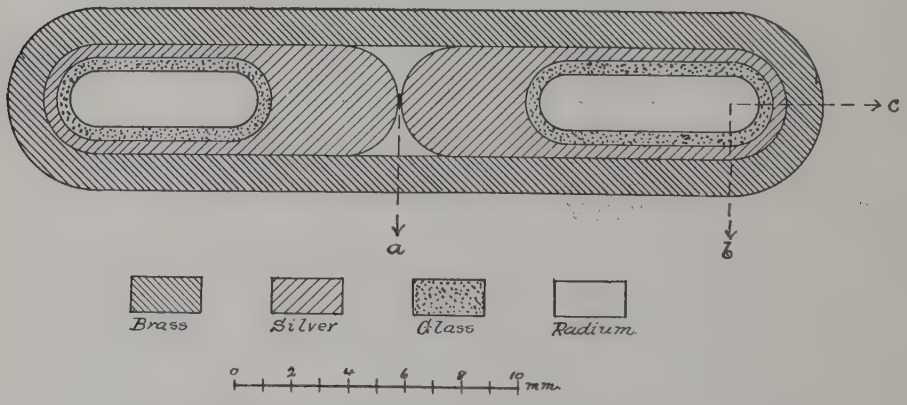


FIG. 148.—THE ARRANGEMENT OF THE RADIUM CAPSULES IN THE BRASS FILTER.

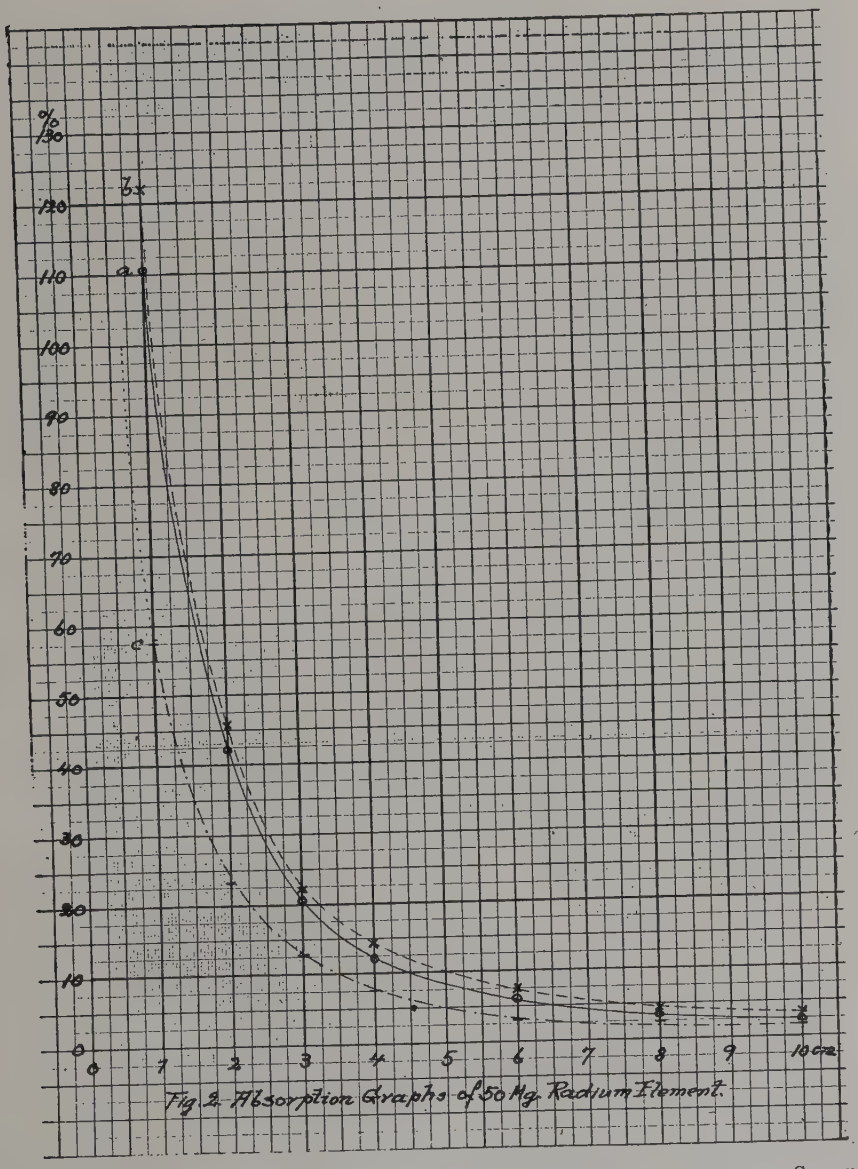


FIG. 149.—ABSORPTION GRAPHS OF 50 MG. RADIUM ELEMENT ARRANGED AS SHOWN IN FIG. 148, MEASURED IN WATER.

from the graphs for the intensities of 100, 60, 40, 20, 10, 5 and 2.5 per cent in the directions *a*, *b*, and *c* (see Fig. 150).

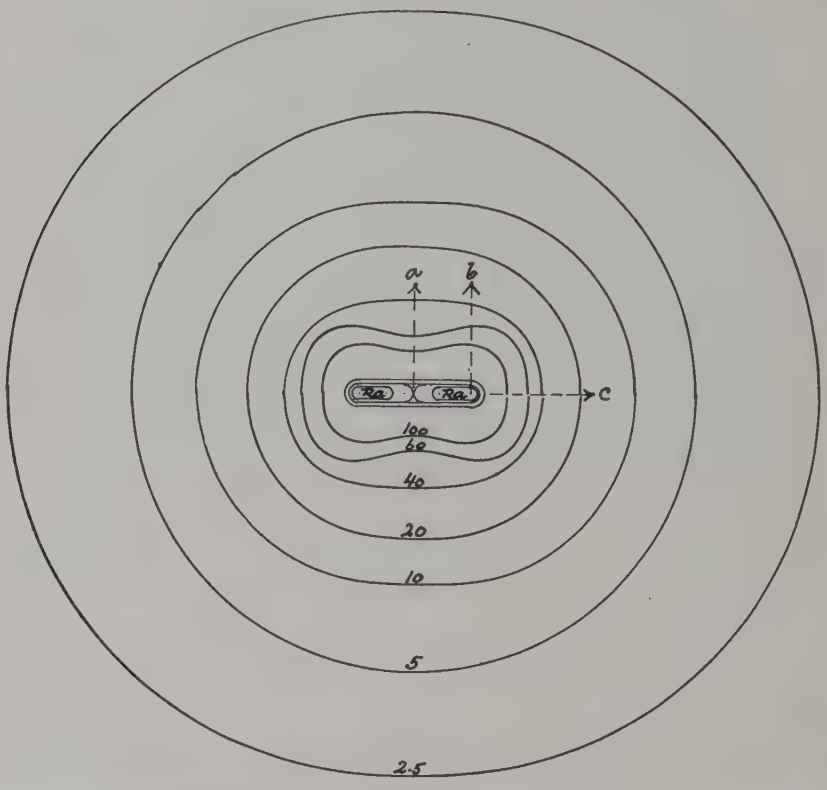


FIG. 150.—THE EQUAL INTENSITY CURVES OF 50 MG. RADIUM ELEMENT IN WATER CONSTRUCTED FROM THE ABSORPTION GRAPHS SEEN IN FIG. 149.

TABLE II

MEASURED VALUES OF 50 MG. ELEMENT RADIUM

Distance in cm.	Direction		
	a	*b*	*c*
1	110.5	122.0	57.6
2	42.2	45.6	23.4
3	21.0	24.2	12.9
4	12.3	14.7	4.5
6	6.1	7.4	3.9
8	3.3	4.2	2.4
10	2.2	2.7	1.6

NEEDLES AND EMANATION

Recently, radium preparations have been introduced which have given radium therapy a wider field of usefulness. The needles are constructed of an alloy which prevents rusting and deterioration. The needles usually contain 10 or 5 milligrams of radium element. The equal intensity curves of a 10 mg. radium element needle have been determined by Bachem, the physicist in our clinic, and are reproduced in Figs. 151 and 152. Five such

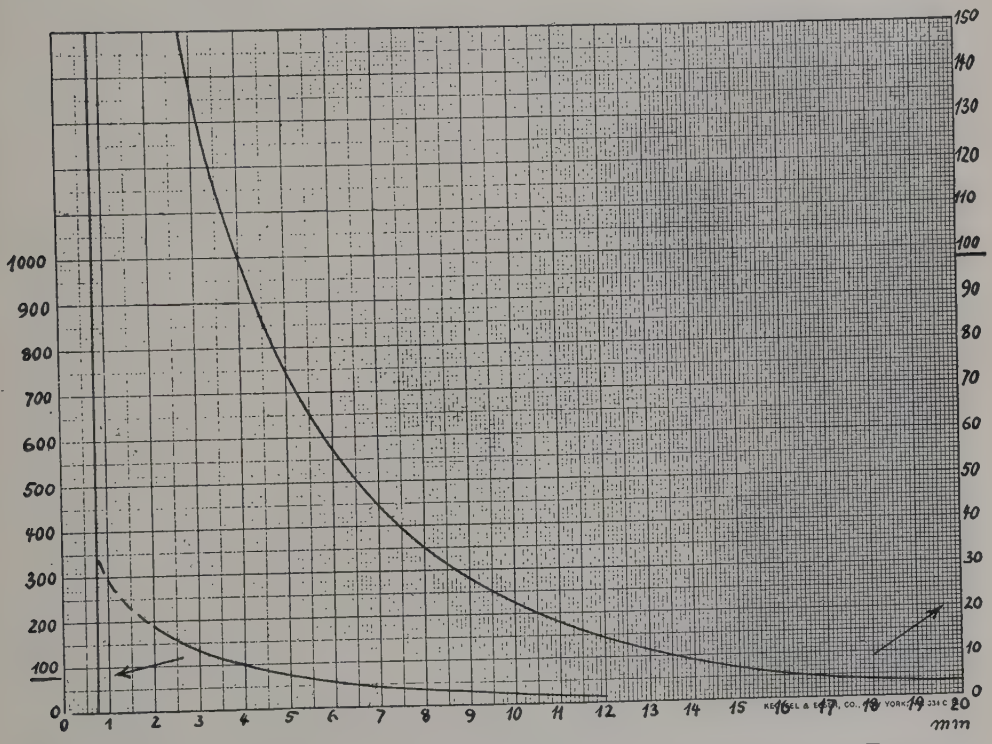


FIG. 151.—ABSORPTION GRAPHS OF A RADIUM NEEDLE OF A CONTENT OF 10 MG. ELEMENT IN WATER.

needles may be placed in a brass filter for intra-uterine application. Patterns, of course, must be made from the isodoses seen in Fig. 151. The 5 mg. radium element needles have the same length as the radium capsules. Hence the equal intensity curves are the same as seen in Fig. 150. A 50 per cent E. S. D. is obtained with the 10 mg. needle at a distance of 0.5 cm., that is, isodose 5 with an application of 8 hours within tissue or water. The radium-containing needles are very useful in surface applications and may also be inserted into tumor masses so that the distance between them is one centimeter. Since a 50 per cent E. S. D. is attained at a distance of 0.5 cm. with an 8 hours' application, it follows that all of the area "needled" receives a gamma ray dose of 100 per cent E. S. D. The intensities in the immediate surroundings of the needles are, of course, higher.

Emanation of radium may also be used. If the gas is placed in glass tubes of the same length as the radium capsules or needles, and if the amount of gamma radiation in the emanation expressed in millicuries in each capsule equals that of 25 or 10 mg. radium element, then the equal intensity curves shown in Figs. 150 and 151 may also be used. The half-absorption period of

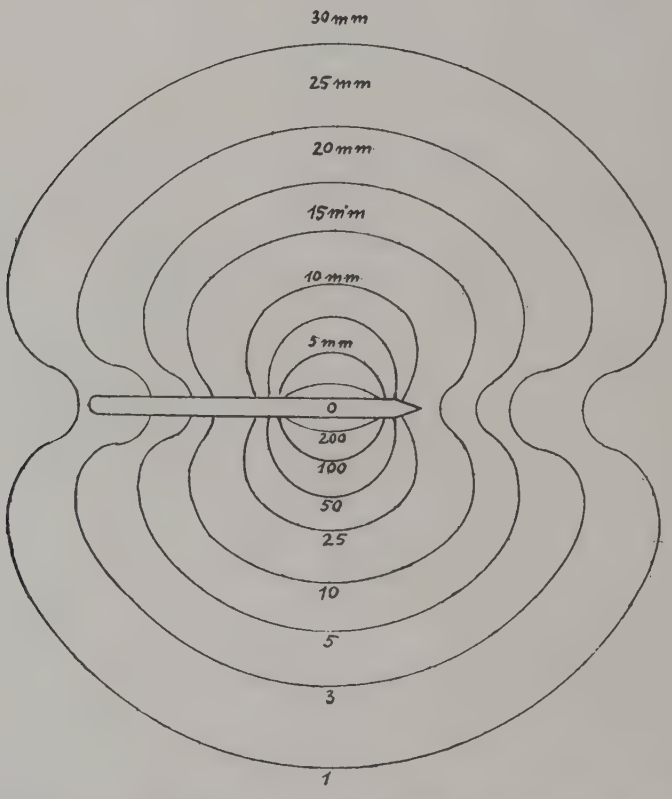


FIG. 152.—EQUAL INTENSITY CURVES OF A 10 MG. RADIUM ELEMENT NEEDLE CONSTRUCTED FROM THE ABSORPTION GRAPHS SEEN IN FIG. 151.

radium emanation differs from that of the salts. This fact must be considered when using radium emanation.

THE BIOLOGIC UNIT AND THE DETERMINATION OF THE RADIATION DOSE

A radiation dose applied to a lesion is expressed in percentage values of the erythema skin dose (abbreviated E. S. D.). It is the unit dose or standard of comparison. This effect is determined by the product of intensity and time. We obtain a full or 100 per cent erythema skin dose if a reddening or erythema of the skin occurs from ten to fourteen days following the application of the rays and a brownish discoloration after an additional four

weeks. The brownish discoloration will persist for a variable length of time—usually from eight to nine months—when the discolored layer peels off, leaving a white normal skin behind. An increase in the time duration of the application of the rays of about 30 per cent will result in a second degree burn of the skin, while a decrease in the time duration of the application of about 30 per cent will cause only a temporary epilation and a subsequent light browning. The 100 per cent E. S. D. can be determined with any one of the measuring instruments mentioned. For instance, we determine th etime duration of the discharge of the Wintz iontoquantimeter, using the factors for the production of X-rays given in Table I, 3 c. If we multiply the number of seconds with the factor 8.5 we obtain the number of minutes necessary for the production of an E. S. D. Thus we are always able to determine the time duration to obtain a skin dose if we daily measure the time duration for the discharge of the electrometer and multiply the number of seconds with the factor 8.5. We must state that the time factors should be determined for each transformer and each measuring instrument. It is also evident that the measuring instruments must be standardized. This could be done by making comparison with our instruments which possess a known capacity. It would be advisable to possess two instruments, as one might get out of order. Such an accident would immediately be discovered, as discrepancies in the measuring results would then exist.

We use a 5 milliampere current. As the time duration of application is 120 minutes, it follows that a 100 per cent E. S. D. is obtained with 600 milliampere minutes; the epilation skin dose is attained with 450 ma. minutes, and a second degree burn or estal skin dose with 750 ma. minutes. Using the same factors for the production of X-rays, namely, 200 kilovolt maximum, 50 cm. F. S. D., 1.0 mm. copper plus 1 mm. aluminum filter, 5 ma., and a field of 15 to 30 cm. square, we can reproduce the skin doses at will. In other words, we know the exact dose applied at the surface and, perusing the intensity graphs of Fig. 146, the percentage intensity, and thereby the radiation dose for each centimeter of body traversed.

The E. S. D. of the gamma rays of the 50 milligrams radium element contained in two capsules and arranged in a brass filter, as seen in Fig. 148, has also been determined. A celluloid box, 6 cm. square and 6 cm. high, was filled with water and placed on the skin of the chest. The radium carrier was placed at a distance of 3 cm. from the skin. This distance corresponds to the isodose 20. The time duration of application to obtain a 100 per cent E. S. D. was 96 hours or 4,800 mg. el. hrs.

If we know the E. S. D. in values of time duration of application or "mg. el. hrs." (milligram element hours) for one of the isodoses, we then can calculate the same factors for all the isodoses. Hence the values for the different isodoses and for the epilation, erythema and estal skin doses are:

TABLE III

Isodose	Epilation S. D.		Erythema S. D.		Estal skin dose	
	Hours	Mg. el. hrs.	Hours	Mg. el. hrs.	Hours	Mg. el. hrs.
60	24	1,200	32	1,600	40	2,000
40	36	1,800	48	2,400	60	3,000
20	72	3,600	96	4,800	120	6,000
10	144	7,200	192	9,600	240	12,000
5	288	14,400	384	19,200	480	24,000
2.5	576	28,800	768	38,400	960	48,000

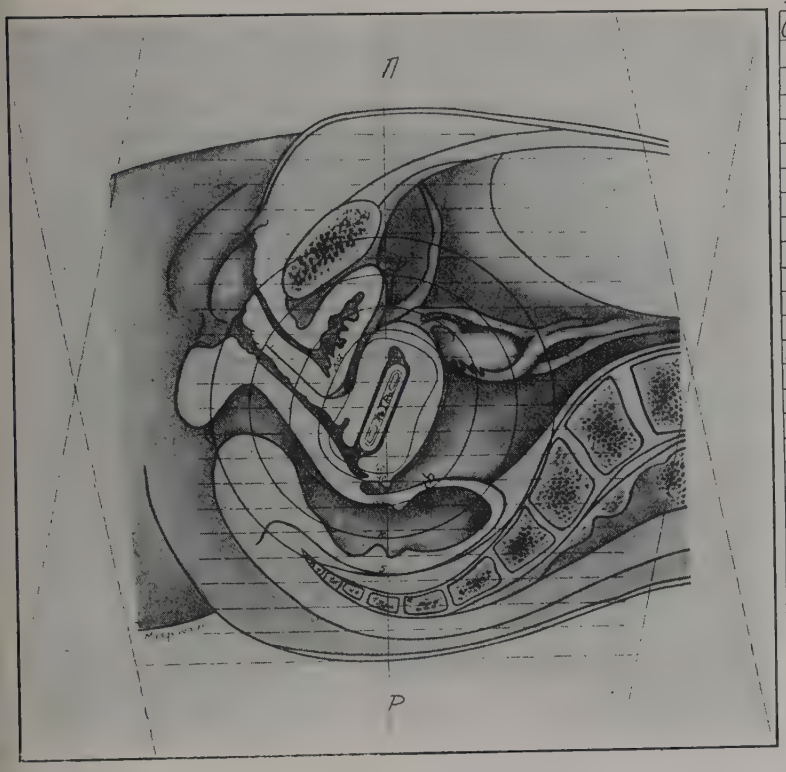
If we apply a 100 per cent E. S. D. to one of the isodoses, we then can calculate the percentage intensities applied within the same time duration to all the other isodoses. Let us assume that we applied the radium capsule for 48 hours, we then have given a 100 per cent E. S. D. to isodose 40. The percentage E. S. D. at the other isodoses are as follows:

Isodose	Time duration of application	E. S. D.
60	48 hrs.—2,400 mg. el. hrs.	150 per cent
40	48 " —2,400 " " "	100 " "
20	48 " —2,400 " " "	50 " "
10	48 " —2,400 " " "	25 " "
5	48 " —2,400 " " "	12.5 " "
2.5	48 " —2,400 " " "	6.25 " "

Or we may intend to apply a 25 per cent E. S. D. at isodose 20. We attain this dose within 24 hours or with 1,200 mg. el. hrs. The E. S. D. percentage obtained at the other isodoses are:

Isodose	Time duration of application	E. S. D.
60	24 hrs.—1,200 mg. el. hrs.	75 per cent
40	24 " —1,200 " " "	50 " "
20	24 " —1,200 " " "	25 " "
10	24 " —1,200 " " "	12.5 " "
5	24 " —1,200 " " "	6.25 " "
2.5	24 " —1,200 " " "	3.17 " "

The practical or clinical importance of the measurements of intensities and the determination of the E. S. D. of X-rays and gamma rays consists in the fact that we are thereby enabled to determine the exact radiation dose obtained within the area of the human body subjected to radiation treatment. We can calculate the doses for the X-rays, the gamma rays, and a combination

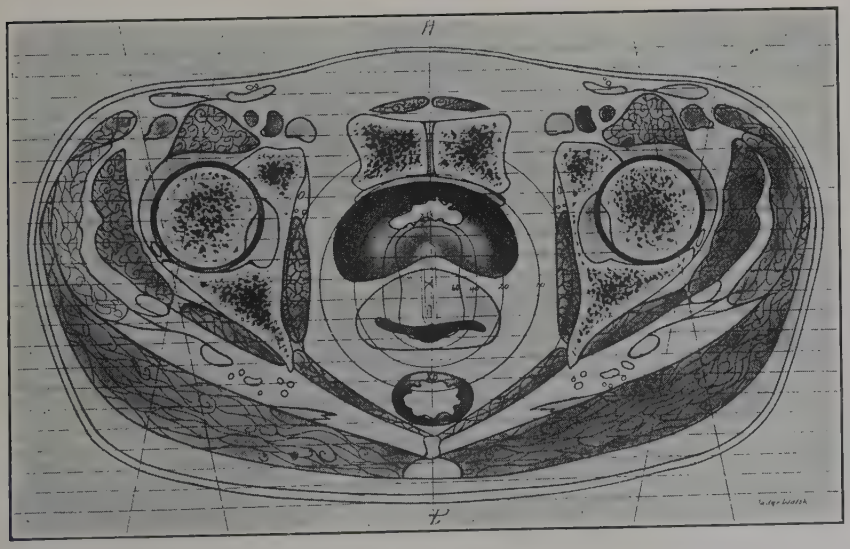


Intensities in Axis A-P.

Cm	A	P	Total	Ra I.
0	100	20	120	
1	94	22	116	
2	87	24	111	
3	81	26	107	+ 1
4	75	28	103	+ 2
5	70	30	100	+ 4
6	65	32	97	+ 8
7	60	34	94	+ 16
8	56	36	92	+ 33
9	52	39	91	+ 50
10	48	42	90	
11	45	45	90	
12	42	48	90	
13	39	52	91	
14	36	56	92	
15	34	60	94	+ 50
16	32	65	97	+ 33
17	30	70	100	+ 16
18	28	75	103	+ 8
19	26	81	107	+ 4
20	24	87	111	+ 2
21	22	94	116	+ 1
22	20	100	120	

12 hours' application of 50 Mg-Ra-El at isodose 60 gives intensity of 50
" " 40 " " " 33
" " 20 " " " 16
" " 10 " " " 8
" " 5 " " " 4
Hence at a we have 90+30=120
" " b " " 94+30=120

FIG. 153.—MEDIAN LONGITUDINAL SECTION OF A FEMALE PELVIS SHOWING RADIUM CAPSULES AND ISODOSES IN SITU AND POSITION OF THE TWO X-RAY BEAMS *A* AND *P*.



0	100
1	94
2	87
3	83
4	75
5	70
6	65
7	60
8	56
9	52
10	48
11	45
12	42
13	39
14	36
15	34
16	32
17	30
18	28
19	26
20	24
21	22
22	20

FIG. 154.—TRANSVERSE SECTION OF A FEMALE PELVIS SHOWING POSITION OF RADIUM CAPSULE AND THE ISODOSES, ALSO THE TWO X-RAY BEAMS *A* AND *P*.

of the two radiations. This method for the calculation of the combined X-ray and gamma ray intensities was first published by Opitz and Friedrich.

We draw a median longitudinal and a transverse section of the patient from exact measurements obtained from the region to be subjected to radiation. Figs. 153 and 154 represent the pelvis of a patient suffering from cervical carcinoma. We have modified a pelvimeter as seen in Fig. 155.

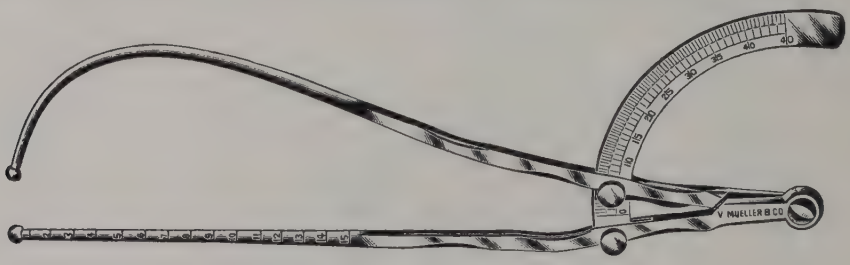


FIG. 155.—MODIFIED PELVIMETER (v. Mueller & Co.).

With the modified pelvimeter we can measure all anatomical landmarks in a transverse and longitudinal direction, also the depth of vagina and the position of the cervix. These are entered upon centimeter paper. Next we mark

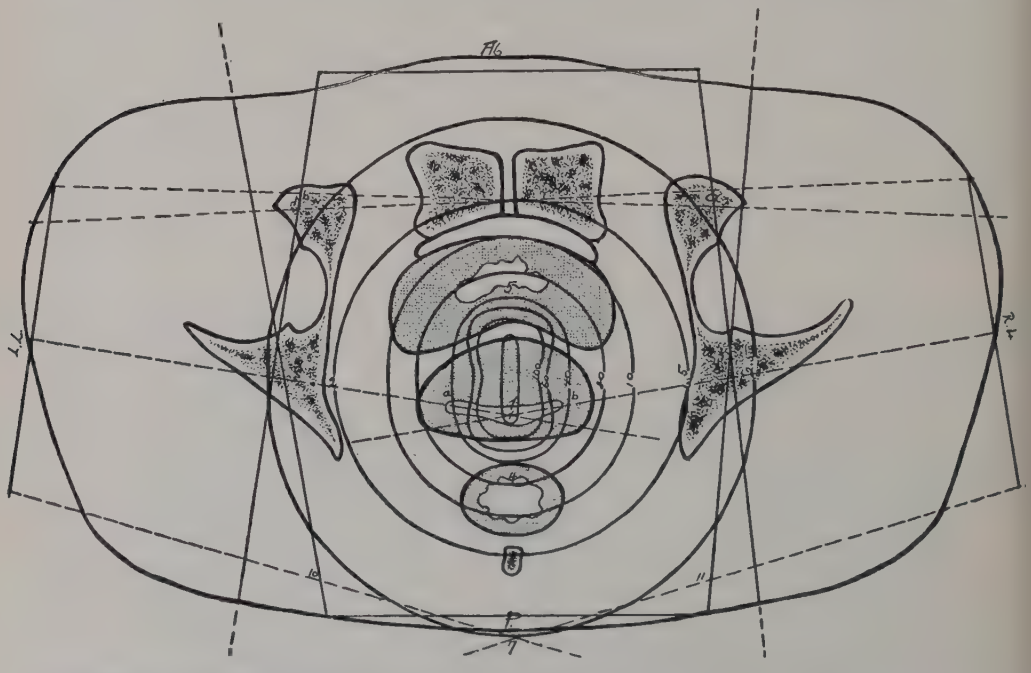


FIG. 156.—TRANSVERSE SECTION OF A FEMALE PELVIS SHOWING FOUR X-RAY BEAMS MARKED *A*, *P*, *R.L.*, AND *L.L*, AND POSITION OF RADIUM CAPSULE AND EQUAL INTENSITY CURVES. The calculations of the intensities of X-rays at points 1 to 11 and *a* and *b* are given in the text.

upon the skin the point of entrance of the axis of the X-ray beams. Fig. 153 shows two X-ray beams anteriorly and posteriorly, marked *A* and *P;* while Fig. 156 shows four X-ray beams anteriorly, posteriorly, left laterally and right laterally, marked *A., P., L.L.,* and *R.L.* To enter the correct extent

of the beams within the body we use the patterns seen in Fig. 157 representing beams of surface diameters of 20 cm., 15 cm., 12 cm., and 9 cm. The size of the X-ray beam to be chosen depends entirely on the circumference of the patient. In a large patient the four beams may have a surface diameter of 15 cm. In a small patient we may have to reduce the lateral fields to 12 or 9 cm. The number of the fields depends solely on the intensities obtained at the intersection of the various beams, designated as 6, 7, 8, 9, 10 and 11 in Fig. 156. The combined doses at these points should not exceed 130 per cent of the E. S. D., though it would be safer to maintain a combined intensity of about 100 to 110 per cent. The peripheral intensities, of course,

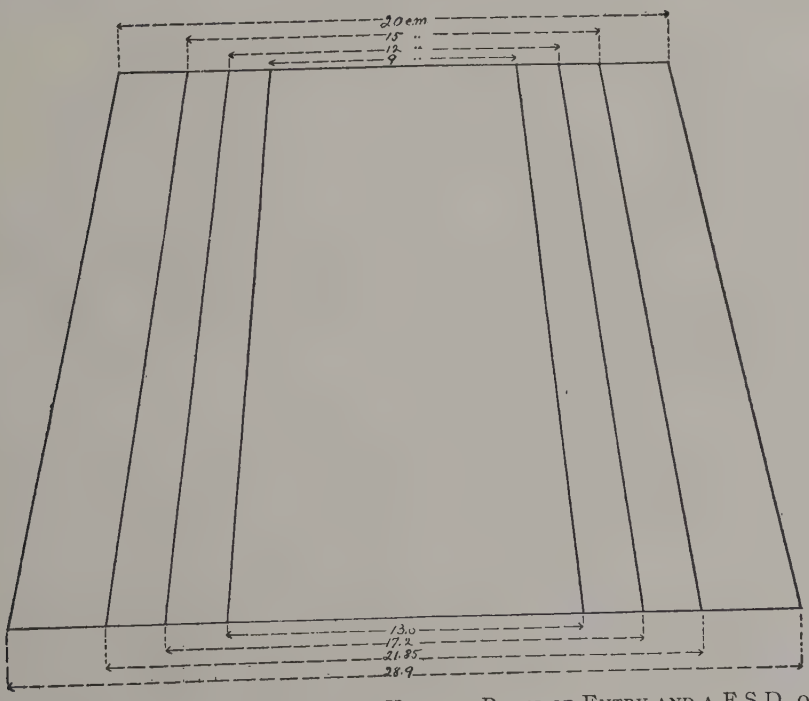


Fig. 157.—Patterns of X-ray Beams with Varying Ports of Entry and a F.S.D. of 50 cm.

are somewhat smaller than those in the center of the field, since the focal distance at the periphery of the beams is greater and the number of scattered rays is smaller. Bachem has determined the equal intensity curves of X-rays for different-sized fields. If the transverse diameter is drawn on tracing paper, we place it on the tables of equal intensity curves of the X-rays and read off the percentage values of intensities attained at these points (see Figs. 158, 159, 160 and 161).

If we apply on the surface an intensity of 100 per cent E. S. D. to each of the four ports of entry, we attain an intensity of 119 per cent E. S. D. at the cervix. However, some of the cervical carcinomata require intensities up to 175 per cent E. S. D. to bring about a resorption of the tumor. It, therefore, follows that additional intensities of radiations must be applied. This may be accomplished by intra-uterine insertion of radium. To determine the

intensities of gamma rays, we enter upon the longitudinal and transverse sections the equal intensity curves with patterns made of the isodoses seen in Fig. 150. The technic is illustrated in Figs. 153, 154 and 156.

Let us assume that the patient to be treated for cervical carcinoma have an antero-posterior diameter of 22 cm. and a transverse diameter of 38 cm., the cervix be 14 cm. distant from the anterior abdominal wall, and the true bony pelvic cavity have a radius of 7 cm. We enter the X-ray beams and

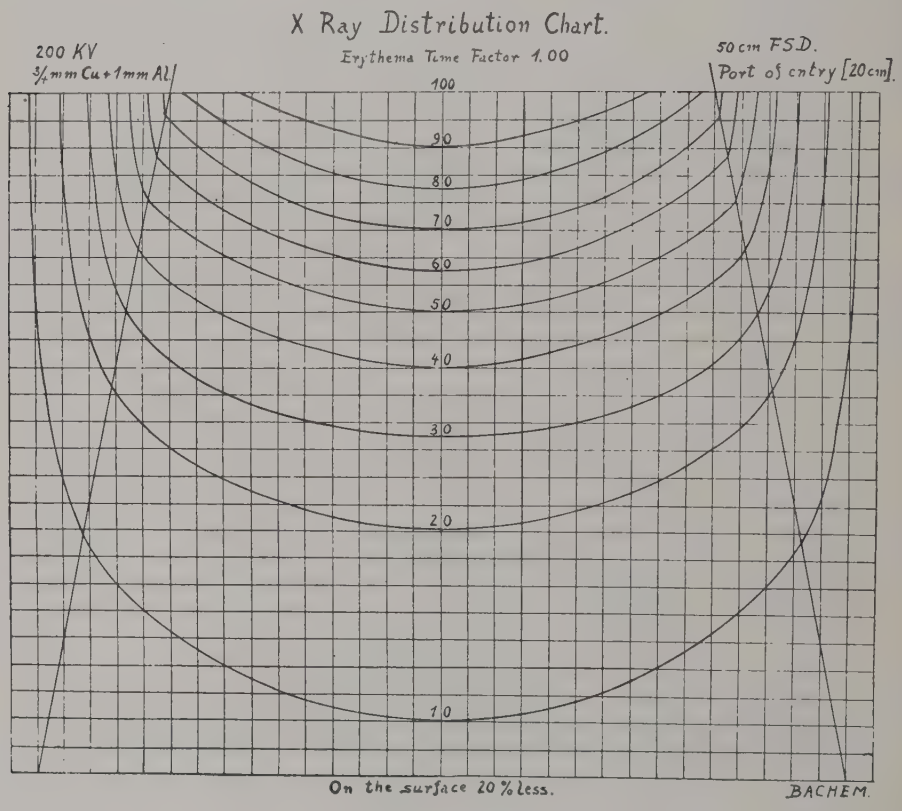


FIG. 158.—X-RAY EQUAL INTENSITY CURVES IF PORT OF ENTRY IS 20 CM.[2]

determine the X-ray intensities at points 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11. They are as follows:

X-Ray beam	1	2	3	4	5	6	7	8	9	10	11
Anterior	31	31	31	26	50	100	15	59	59	12	12
Posterior	50	42	42	62	32	15	100	23	23	89	89
Left lateral	19	36	11	17	19	0	14	39	10	30	10
Right lateral	19	11	36	21	19	0	14	10	39	10	33
Sum	119	120	120	126	120	115	143	131	131	141	144

Intensities above 130 E. S. D. must be reduced. If the posterior field is reduced by 25 per cent by changing the time duration of application to 90 minutes, we may deduct the following:

Values to be deducted....	12	10	10	15	8	4	25	6	6	22	22
Balance.....	107	110	110	111	112	111	118	125	125	119	122

If we intend to add radium intensities to the X-ray intensities we must proceed as follows: At 4, the anterior rectal wall received 111 per cent

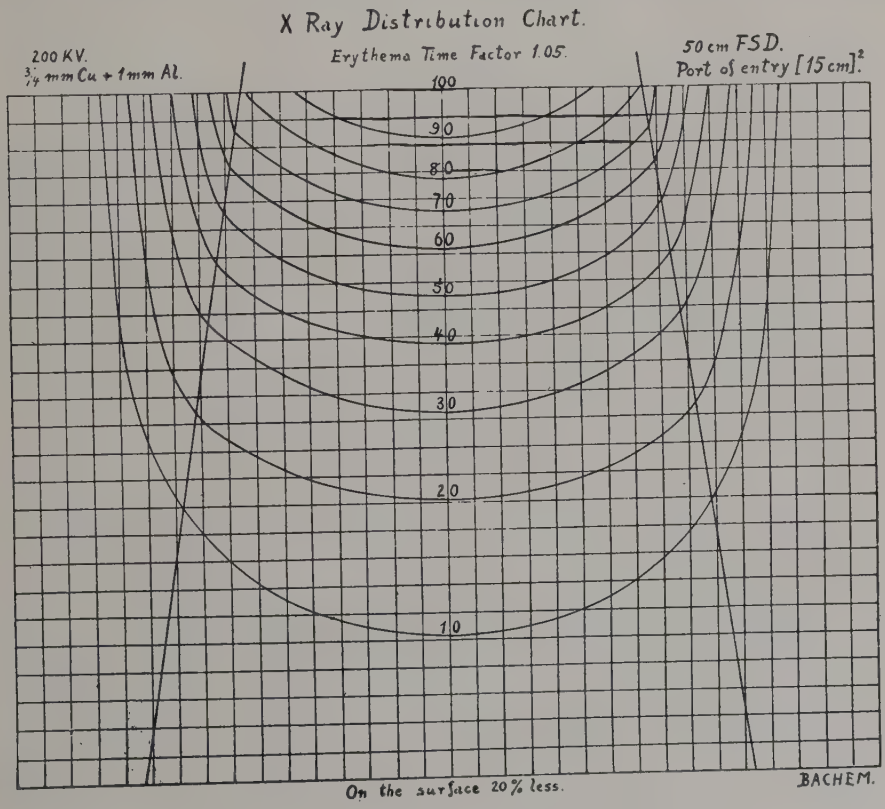


FIG. 159.—X-RAY EQUAL INTENSITY CURVES IF PORT OF ENTRY IS 15 CM.²

E. S. D. of X-rays. We may add 40 per cent E. S. D. of gamma rays and cause a transient burn of the rectal mucosa. Point 4 lies on equal intensity curve 20, hence 40 per cent E. S. D. will be obtained in about 40 hours application of 50 mg. radium element, as 100 per cent E. S. D. are attained with 96 hours' application, that is, 4,800 mg. cl. hrs. This would not give the intensities required for squamous cell carcinomata, but would suffice for adenocarcinomata and basal cell cancers.

Let us again assume that the same conditions prevail, but we first give the radium application, employing a full dose of 100 per cent E. S. D. at

points 4 and 5, that is, 4,800 mg. el. hrs. attained with 50 milligrams radium element in 96 hours at the equal tensity curve 20. Hence, the values obtained at the other isodoses are as follows:

Equal intensity curve	Application of 4,800 mg. el. hrs. give per cent E. S. D.
60	300
40	200
20	100
10	50
5	25
2.5	12.5

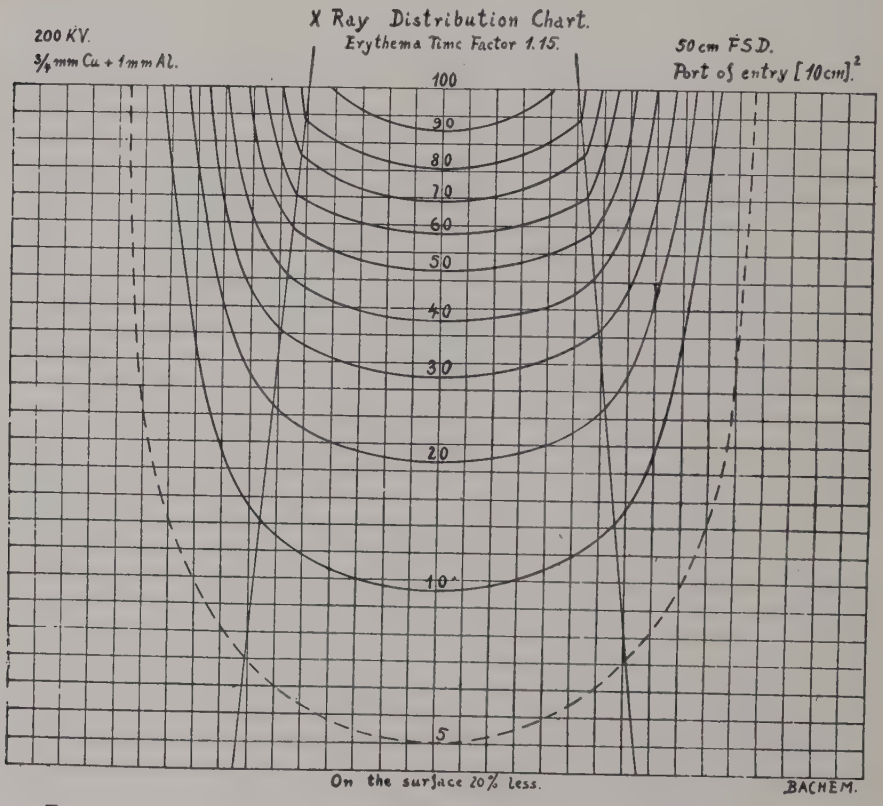


FIG. 160.—X-RAY EQUAL INTENSITY CURVES IF PORT OF ENTRY IS 10 CM.²

Since the 40 and 60 isodoses lie within the uterine organ they cause a destruction of it. This is not objectionable. By calculation and addition of X-ray intensities we find that only two fields of X-rays should be used, namely, an anterior field with 100 per cent E. S. D. and a posterior field with 75 per cent E. S. D., provided we use an X-ray obtained from 200 Kv., max., 5 ma., 1 mm. copper plus 1 mm. aluminum filter, 50 cm. F. S. D., and ports

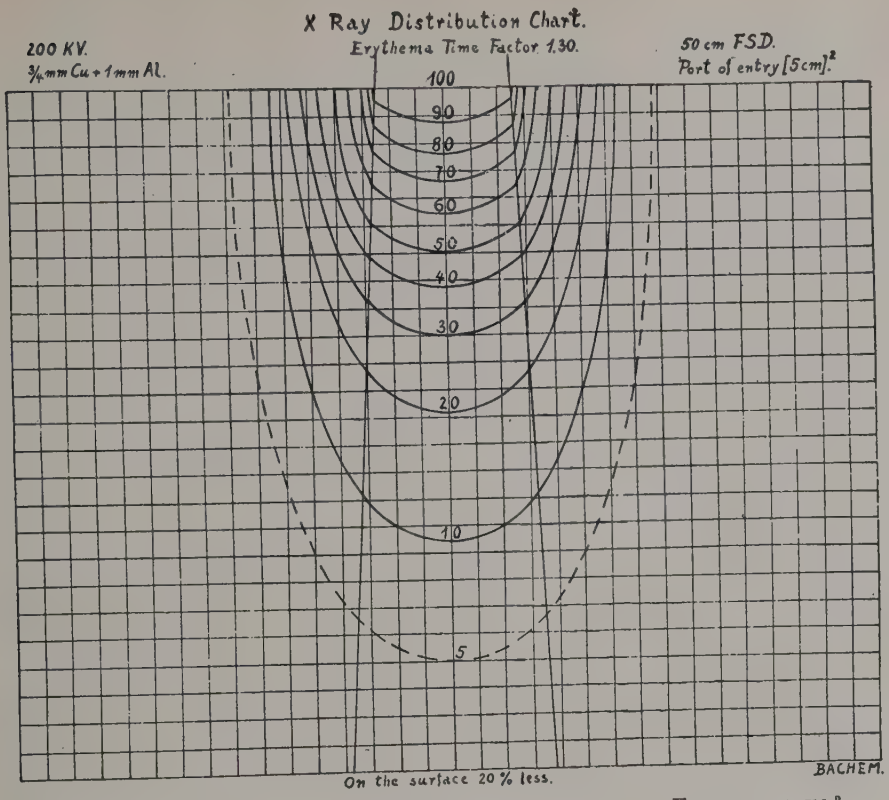


FIG. 161.—X-RAY EQUAL INTENSITY CURVES IF PORT OF ENTRY IS 5 CM.²

of entry of 15 or 20 cm. square. They give an intensity of 42 per cent at a depth of 10 cm. The X-ray intensities are as follows:

Depth	Anterior beam, 100 per cent	Posterior beam, 75 per cent	Total intensities	Depth	Anterior beam, 100 per cent	Posterior beam, 75 per cent	Total intensities
0	100	11	111	12	36	32	68
1	91	12	103	13	33	34	67
2	84	13	97	14	30	37	67
3	77	14	91	15	27	40	67
4	71	16	87	16	25	44	69
5	65	17	82	17	23	49	72
6	59	19	78	18	21	53	74
7	54	20	74	19	19	58	77
8	50	22	72	20	17	63	80
9	46	25	71	21	16	68	84
10	42	27	69	22	14	75	89
11	39	29	68				

Hence the combined intensities would be:

Intensities	Points						
	1	2	3	4	5	*a*	*b*
Gamma rays	300	25	25	100	100	200	200
X-rays	69	63	63	73	74	74	74
Total	369	90	91	173	174	274	274

It is seen that the rectal and bladder mucosae receive almost a destructive dose. Keeping the bladder empty during the radiation by the insertion of a retention catheter and filling the vagina firmly with gauze and emptying the rectum with castor oil, colonic flushings and liquid diet we reduce this danger to a minimum.

If we apply a gamma ray intensity of 175 per cent E. S. D. at points 4 and 5, which will be attained by an application of 8,400 mg. el. hrs., i.e., within 168 hours' application of 50 mg. radium element, then the per cent E. S. D. present at the other isodoses are:

Isodose	8,400 mg. el. hrs. give per cent E. S. D.
60	525
40	350
20	175
10	87.5
5	43.8
2.5	21.9

At point 1 we apply 525.0 per cent E. S. D.
" " 2 " " 43.8 " " "
" " 3 " " 43.8 " " "
" " 4 " " 175 " " "
" " 5 " " 175 " " "
" " *a* " " 350 " " "
" " *b* " " 350 " " "

Even if these greater intensities of gamma rays are applied, only a stimulating dose at the lateral pelvic structures is obtained, which is dangerous in the presence of cancer invasion of the regional lymph-nodes. The destructive dose also reaches well into the paracervical tissues. Therefore it is obvious that the combined method of radium and X-rays should be used. By proper calculation a distribution of rays of almost equal intensities all through the pelvis can be arranged, provided the combined application of radium and X-rays is used.

So far I have discussed the problem of the determination of radiation intensities in relation to cervical carcinoma. Other problems of dosation are

met with in gynecology, as the uterine hemorrhages resulting from benign diseases, the hemorrhagic metropathies, and the uterine myomata. The object of radiation treatment in these diseases is either to destroy the endometrium with the gamma rays or to arrest ovulation with the X-rays. The destruction of the endometrium by rays is based on the same principle as a supracervical corpus amputation, while the arrest of ovulation resembles a castration. Since the action of radium is local and intensive it has been used for the destruction of the endometrium and, as the action of the X-rays is rather extensive, that is, the beam is diffused over a large field, the latter have been used for the arrest of ovulation.

The technic of the intra-uterine insertion of radium in benign uterine hemorrhages is a simple one. It is generally conceded that a 24-hour application of 50 mg. of radium element suffices to destroy the endometrium. Referring to the table of isodoses of radium we see that a dose of 1,200 mg. el. hrs. equals a 75 per cent E. S. D. at isodose 60 and 125 per cent at isodose 100, and of course within the isodose 100 the intensities are very much higher. The greater portion of the endometrium lies within the isodose 100 and receives a lethal dose. The ovaries are 4.5 to 5 cm. laterally from the central axis of the uterus, hence at about the isodose 10. They therefore receive one sixth the intensity applied at isodose 60 which is 12.5 per cent. We shall see in the next section that this intensity rather irritates ovarian function and increases ovulation. Hence it would appear that the contention often made, namely, that the gamma rays act by arresting the process of ovulation, is untenable.

The radiation dose to cause an arrest of ovulation has been termed by Kroenig [14] "the ovarian dose" and from many clinical observations it was placed at 30 per cent of a 100 per cent E. S. D. Hoehne and Linzenmeier [15] investigated the position of the ovaries within the pelvis by determining (1) the distance between the ovaries, and (2) the distance of the ovaries from the anterior abdominal wall in the living woman. The measurements were made from bimanual palpations and actual measurements in the course of laparotomies. The results were: The distance between the ovaries was 9 to 10 cm. The distance of the ovaries from a plane through the anterior superior spinous processes of the innominate bones was on an average 6½ cm. on the right side and 6 cm. on the left side. The dislocation of the ovaries with the myomatous uterus have been studied in my clinic and practical average values could not be obtained.

The problem of the application of a roentgen castration dose in myomata uteri is therefore as follows: A 30 per cent E. S. D. must be applied to the ovaries which lie at a depth of 6½ cm. Referring to Fig. 146 we see that at 7 cm. a 60 per cent intensity is attained if a 100 per cent E. S. D. is applied to the anterior abdominal wall with a 200 Kv. max. X-ray. The time duration to obtain the 100 per cent E. S. D. is 120 minutes. The castration dose is 30 per cent. Hence a 60 minutes' application will bring about the desired result, provided the same factors for the production of the X-rays as indicated are used.

If the myomatous uterus is large, the two-field method of X-ray appli-

cation must be used as illustrated in Fig. 153. We measure the antero-posterior diameter. Let us assume it to be 32 cm. The combined intensities for the two fields of X-rays are as follows:

Centimeter	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
Anterior field	100	84	70	59	50	42	36	30	25	21	17	14	12	11	10	9	9
Posterior field	9	9	10	11	12	14	17	21	25	30	36	42	50	59	70	84	100
Total	109	93	80	70	62	56	53	51	50	51	53	56	62	70	80	93	109

The ovaries probably are located somewhere between 14 and 20 cm. Hence we may reduce the time duration of application to 75 minutes for each field, since 30 per cent E. S. D. is the castration dose.

The discussion of the problem of dosage is deemed sufficient to enable the student to determine an exact plan of the application of rays.

THE ACTION OF THE RAYS ON THE LIVING CELL AND THE CONSTITUTIONAL REACTION

The reaction of the various elementary cells and tissues to irradiation differs. The different behavior depends on the radiation dose applied, on the biological and histological nature or structure of the cells, and on the degree of the activation of the systemic defensive forces of the host.

The determination of a 100 per cent E. S. D. is contingent on the visible changes caused by rays in the squamous cells of the skin—the epidermis. These changes are reddening and, subsequently, deep tanning. We distinguish the following skin doses: (1) the epilation skin dose; (2) the erythema skin dose; (3) the estal skin dose; and (4) the lethal skin dose.

The epilation skin dose produces temporary loss of hair after about four weeks and a subsequent faint tanning or browning. It is attained by the application of about 70 per cent E. S. D. The erythema skin dose evinces a distinct reddening of the skin within ten to fourteen days after radiation, an almost permanent epilation, and a subsequent deep brown discoloration appearing about the sixth week after radiation. The tanned skin peels off within from nine to twelve months, leaving a clear white skin behind. The erythema skin dose results from the application of a 100 per cent E. S. D. The estal skin dose is characterized by burns of the second degree with the formation of blisters and loss of the superficial layers of the skin. The latter heal in from six to eight weeks. A rose-colored tender skin is left behind in the area of which telangiectasias appear in the course of a few months. These changes are permanent. An estal skin dose results from the application of about 130 per cent E. S. D. The lethal skin dose resembles a third degree burn. The irradiated skin area ulcerates and necrotizes. As soon as the slough separates, we observe a clean-cut ulcer which may respond to aseptic dressings, thermal light rays or actinic rays. It often refuses to heal and

as soon as the dead tissue has become separated and healthy granulations have formed, we may cover it with pedicled flaps of skin. A 175 to 200 per cent E. S. D. will invariably cause such an accident.

The object of radiation therapy is the application of an energy or rays which will destroy abnormal cells and tissues but will not permanently injure normal tissues and organs. The highest permissible or maximum dose for the normal epidermis appears to be about 130 per cent E. S. D.; the highest permissible dose for muscle tissue about 150 per cent E. S. D., for connective tissue about 200 per cent E. S. D., and for mucous membranes about 130 to 150 per cent E. S. D. Lymphoid tissue reacts to much smaller doses, for instance, ovarian and testicular tissue to 25 to 30 per cent E. S. D. By the highest permissible dose is meant a dose causing temporary arrest of function and temporary degeneration of the characteristic organ or tissue cell, followed in the course of time by a complete restitution of function, though permanent alterations in the cells or tissue almost always occur.

Opitz [16] states that we measure the energy of rays applied to the skin or in the depth of the body but never the total amount of rays absorbed by the body or the diseased organ. Using the same factors for the production of the rays and measuring the energy applied, we are in a position to study the action of the rays on the tissues and organs. The latter differs, depending on the energy applied. The action is threefold: (1) irritating, the function is increased without causing histologic changes; (2) inflammatory, function is disturbed, but complete restitution is possible; and (3) lethal or killing, where there is complete loss of substance and, therefore, of function; consequently we may speak of an irritating dose, an inflammatory dose, and a lethal dose. The radiation doses that should bring about the different stages of changes vary greatly, depending on the organ or tissue in which it is intended to produce these effects.

The irritating dose of the ovary is 6 to 12 per cent E. S. D. Amenorrhea and oligomenorrhea are thereby changed to a normal menstruation. The inflammatory dose is 15 to 25 per cent E. S. D. The maturing follicles perish but not the primordial follicles. Menstruation may reappear within from six to twelve months. The lethal dose is 30 to 50 per cent E. S. D. The cessation of ovulation is permanent.

The degeneration or destruction of abnormal cells by the action of rays depends on the character and species of the tumor cell according to the law of Bergonié and Triboudeau: "Immature cells and cells in an active state of division are more sensitive to rays than are cells which have already acquired their fixed adult morphologic and physiologic characters." Colwell and Russ [17] distinguish between a "differential" action which different rays have upon the same variety of cell, and the "selective" action which the same kind of radiation has upon the many different varieties of cells. Kroenig and Friedrich,[18] however, found that the intensity of the biologic action is independent of the hardness or quality of the rays; it is only dependent on the radiation energy absorbed. Glocker [19] refers to the observation of Compton and Crowther that the secondary scattered radiation is softer than the primary radiation. If primary and scattered radiations are qualitatively the same,

then differences in the biologic action cannot exist whether one large, or multiple small, radiation beams are used, as long as the same energy of rays has been applied at a given place within the body. However, should Compton and Crowther's investigations be correct, then the biologic action will be larger with the large field, due to the greater proportion of the more readily absorbable scattered rays. Glocker therefore assumes that softer rays, on account of their greater absorbability, have a greater biologic action than harder rays, provided the same dose is applied.

As we can measure the radiation energy applied, we can also determine the differences of sensibility of the various kinds of tumor cells and the different species in each kind. The tumors found in the female generative organs are derived from either the epithelial cells, the connective tissue cells, the endothelial cells, and inclusions of fetal cells, that is, the cystic and solid embryomata. The new growths of practical importance in radiation therapy are the malignant epithelial cell cancers, and the benign and malignant connective tissue growths.

The carcinomata are composed of either basal cells, squamous epithelial cells or cylindrical epithelial cells. The basal cells are undifferentiated, unripe spindle-shaped cells arranged in alveoli. They have not as yet acquired the mature, definite form of the squamous or cylindrical epithelial cells. The squamous epithelial cells are arranged in cones or papillae and are often hornified, that is, show epithelial pearl formation.

The cylindrical cells have usually an adenomatous arrangement of the cells either of an acinous or tubular type. They are divided into adenoma malignum and carcinoma glandulare. The former is mostly a carcinoma simplex, the glandular structure being maintained though the cells may be stratified or form solid cell masses. In the glandular carcinoma the gland lumen is solidly filled with cells, but the form or structure of the gland is maintained.

Carcinomata may be of a soft consistence, when they are of a medullary type. The tumor is mainly composed of carcinoma cells with a very insignificant connective tissue framework. The alveoli are large. The medullary type tumors grow very rapidly, infiltrate the surrounding tissues early, and cause early death. The epithelial cell cancers may be of a medium consistence, when cells and stroma are present in an even amount. This type has been termed carcinoma simplex. Or the epithelial cell growth may be of a hard consistence, when the connective tissue framework predominates. It is termed a scirrhus cancer and is comparatively benign. The alveoli are small. The scirrhus cancers are usually sharply limited. Schottländer and Kermauner [20] found in 140 cervical carcinomata 115 primary solid cancers and 25 primary adenomatous cancers. In the 115 primary solid cancers they had 73 medullary, 12 simplex, and 30 scirrhus types.

Carcinomata may be observed macroscopically either as rapidly proliferating and everting tumors, or ulcerating growths causing rapid loss of tissue and crater formation, or infiltrating, inverting tumors, spending their activity in rapid invasion of the tissues or organs. Schottländer and Kermauner divide the growth of cancers into exophytic, exo-endophytic and endophytic. The percentages of solid carcinomata in these groups are 5, 24 and 71, and

of adenocarcinomata 17, 46 and 37. There is no connection between the type of cell and manner of growth. The infiltrating growths surpass the everting growths.

Clinically, the basal-celled, medullary, and infiltrating tumor is the most malignant.

The radiation sensibility of carcinomata coincides with these observations: The basal-celled cancer is most sensitive and the epithelioma is most resistant to rays; the medullary type of either variety reacts readily to radiations; the scirrhus type is more resistant. Karyokinesis is prevalent in the former. The stage of cell-division also appears to be predominant in the rapidly growing everting or exophytic growth.

Dominici [21] states that basal-celled epitheliomata are very sensitive, while the horny, squamous-celled epitheliomata are very refractory to radiations.

The question arises, Can the radio-sensitiveness of the different epithelial cell types, structures, and growths of cervical carcinomata be determined in percentage of E. S. D.? The action of the rays on carcinomata is either irritating, inflammatory or lethal. It depends solely on the dose applied. The irritating dose lies between 50 and 60 per cent E. S. D.; the inflammatory dose between 70 to 100; and the lethal dose between 100 and 175 per cent E. S. D. We are interested only in the lethal carcinoma dose. It must cause a resorption of all the carcinoma cells. I do not wish to create the impression that the resorption means an absolute cure. The proof of the efficacy of the lethal carcinoma dose can be rendered only by the examination of tissues removed within stated intervals after the cessation of the irradiation. The radiation dose is lethal if all the cancer cells have been resorbed.

I have kept careful records of the radiation dose applied in 404 cases of cervical carcinomata. I also collected all microscopic sections made and maintained a thorough follow-up system. I used the same radium capsules in all my cases. Therefore the intensities applied could be calculated from the isodoses. Since the equal intensity curve 40 forms an ellipse 4.5 cm. wide and 6.5 cm. long and, therefore, includes the carcinomatous cervix, we express the radium dose in percentage of the intensity times time attained at isodose 40. Referring to the table of radium intensities on page 362, we may state that a 48 hours' application of 50 milligrams radium element gives an E. S. D. of 100 per cent at isodose 40; a 96 hours' application a 200 per cent; a 72 hours' application 150 per cent; and so forth.

The tentative conclusions at which I arrived in this study may be thus stated: Basal-celled cervical cancers require a lethal dose of about 100 per cent E. S. D.; cylindrical cell cancers require a lethal dose of about 130 to 150 per cent E. S. D.; and the squamous cell cancers about 175 per cent E. S. D.

Sarcomata also evince a difference in sensitiveness to the rays. The lethal dose of the small round-cell sarcoma is probably 70 per cent E. S. D.; of the small spindle-cell and mixed-cell sarcoma about 130 per cent; of the large spindle-cell sarcoma about 175 per cent. The giant-cell sarcoma is clinically benign and reacts only to large radiation doses of about 200 per cent E. S. D.

The histological changes caused in carcinoma cells by the application of a lethal carcinoma radiation dose are: (1) A serous infiltration and an enlargement of the cells and cell nuclei; (2) A degeneration of the cell bodies and cell nuclei in the form of vacuolation and granulation of protoplasm, cessation of mitosis, karyorrhexis, karyolysis, achromatism, and finally cytolysis; (3) An inflammatory reaction resulting in lymphocytic and leukocytic infiltration and a proliferation of the connective tissue stroma accompanied by fibroblastic proliferation. The latter develop into highly differentiated connective-tissue

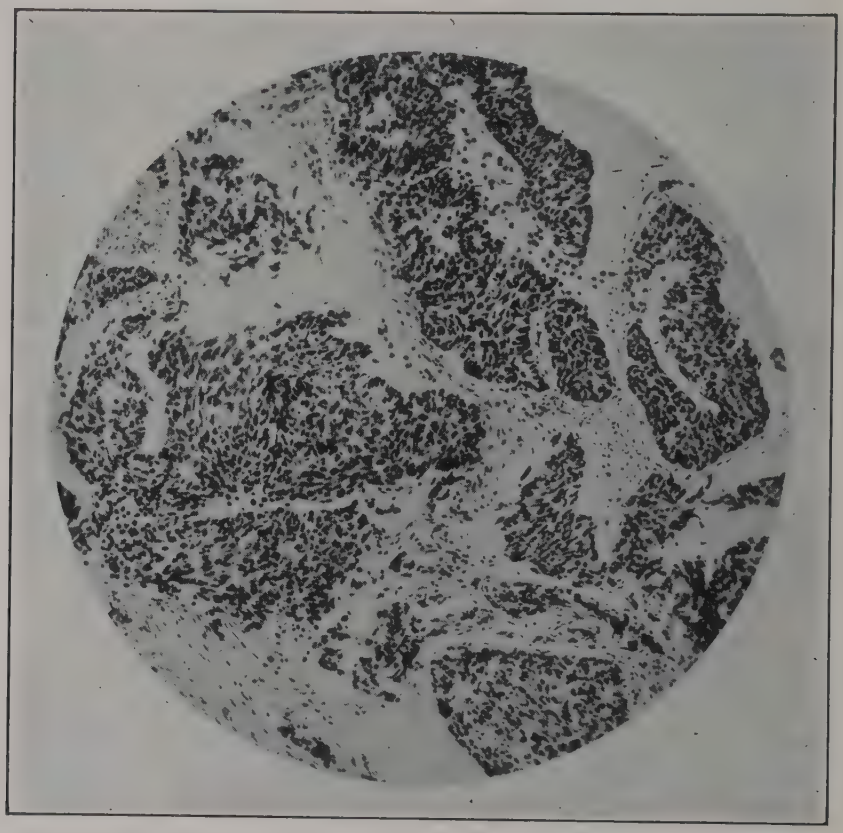


FIG. 162.—UNRIPE BASAL-CELLED CARCINOMA OF THE UTERINE CERVIX BEFORE RADIATION TREATMENT.

cells and fibers. The cytolysis causes an excavation of portions of the tumor. The spaces are filled with granulation and connective tissue which become covered with epithelium, or, if necrosis occurs, with scar tissue. The round-cell and connective-tissue cell proliferations also have another additional significance. Their phagocytic faculties are instrumental in removing the débris of the necrobiotic cellular and nuclear rests. The different carcinomata react differently to rays, as seen in Figs. 162 to 169.

The microscopic examination of radiumized carcinomata often reveals the presence of abnormal cells after supposed completion of the local healing.

They are in a state of retrogression. It is impossible to state whether these degenerated cancer cells are only dormant or are absolutely harmless and dead.

Prime [22] exposed mouse carcinomata to rays and concludes that the action of rays affects the cell nucleus in preventing further mitosis. Such radiumized tissue will not grow when inoculated in mice. Radium does not kill the cells outright, but injures the nucleus in such a manner as to prevent further division, which must eventually result in the death of the cell if its energy is expended in growth and division and not in a purely mechanical function.

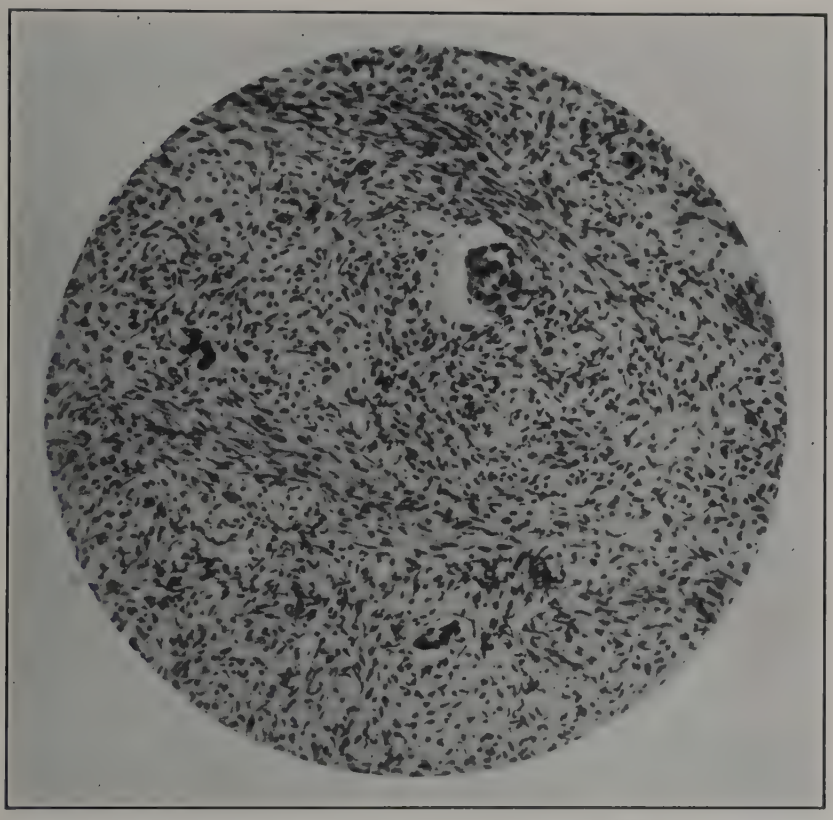


FIG. 163.—THE HISTOLOGICAL CHANGES CAUSED WITHIN THREE WEEKS IN THE BASAL-CELLED CARCINOMA SEEN IN FIG. 162 WITH A COMBINED 100 PER CENT E. S. D. OF RADIUM AND X-RAYS.

The action of rays on inflammatory tissues depends on one of three phenomena: (1) The irritation by rays of the defensive cellular elements; (2) the destruction of rays of the anatomical elements modified by the inflammation; and (3) the absorption of the degenerated tissue by the phagocytes and its replacement by scar tissue.

This statement would imply that a known radiation energy or dose is applied either to stimulate the healing process or to destroy the product of inflammation. The statement also presupposes that inflammatory products are more easily acted upon by the rays than normal tissue. This, indeed, is borne out by clinical observation. However, the reactions of inflammatory

tissues to radiations vary. The variation depends on the underlying bacterial cause and histological changes. Thus, simple inflammatory glands are quickly influenced; suppurating glands are not amenable to radiation treatment. Lymphadenomatous glands are less quickly acted upon, but they invariably diminish in size after a thorough exposure. Tuberculous glands are less readily affected. It may require repeated exposures to induce retrogressive changes, but ultimately they also slowly respond to radiation treatment.

FIG. 164.—ADENOCARCINOMA OF THE UTERINE CERVIX.

Inflammatory diseases of organs respond in a similar manner. The catarrhal and chronic inflammatory hypertrophies subside readily after a correct application of rays. Suppurative processes and abscess cavities must first be evacuated and drained before they are exposed to rays. Tuberculous inflammation should not be treated with rays if the process is acute or cheesy. The chronic and dry forms react promptly to a proper radiation dose.

An irritating dose of rays should be applied in the treatment of inflammatory processes. If the inflammation affects epithelial cells, then the stimulating dose of rays should be about 50 per cent of the E. S. D. If the inflammation involves lymphatic structures, the dose should be about 15 per

cent of the E. S. D. Tuberculous inflammations of epithelial or endothelial tissues require about 60 per cent E. S. D., of tuberculous glands about 30 per cent E. S. D. Lymphadenomata and pseudo-leukemic lymph-nodes are treated with 30 per cent E. S. D., primary lymphosarcomata with about 50 to 70 per cent E. S. D. They usually are of the small round-cell or small spindle-cell type.

Finally, we must refer to organ irritation by the rays to correct abnormal functioning of the genital organs, such as amenorrhea and oligomenorrhea in the presence of a normal uterus. The irritating dose of the ovary is from 6 to 12 per cent E. S. D.[23]

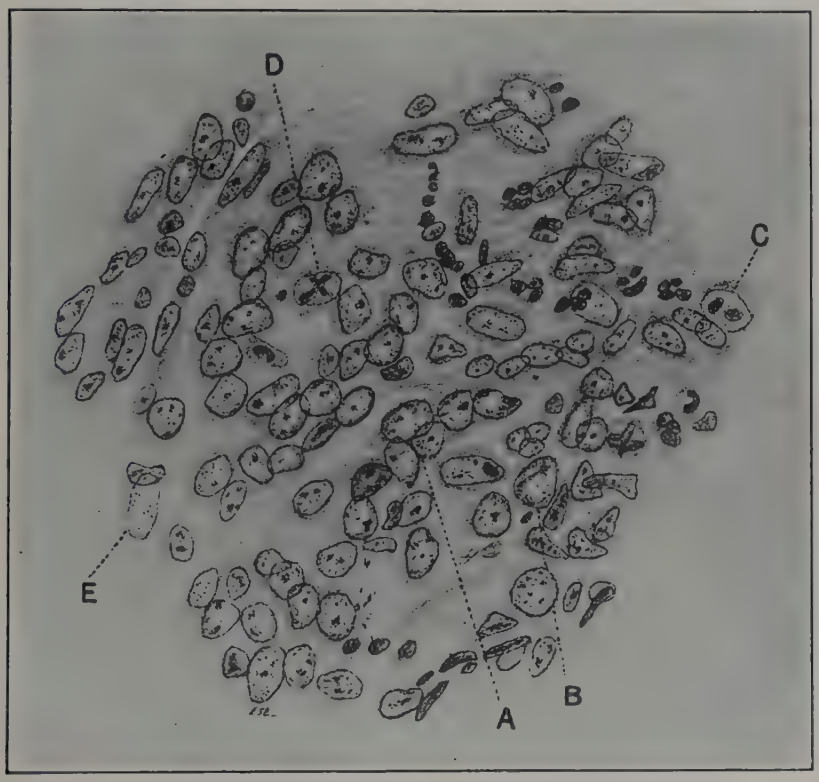


FIG. 165.—HIGH POWER MAGNIFICATION OF AN AREA IN FIG. 164.

The menorrhagias and metrorrhagias accompanying adnexal diseases, and the pernicious bleeding from different parts of the body during the pregnant state are often intractable to the usual methods of treatment. Though the adnexal disease may have been clinically or surgically healed, the uterine hemorrhages may persist even after repeated curettages. These hemorrhages respond almost immediately to an exposure of the spleen to a stimulating dose of rays of about 15 per cent E. S. D. We cannot explain the mode of action. It contradicts the teachings of physiology that stimulation of the spleen reduces the coagulability of the blood.

Wolmhäuser and Enfinger [24] apply a 33 per cent E. S. D. to the splenic

field, hence about 10 to 15 per cent E. S. D. are attained in the center of the organ. Should the uterine hemorrhages not cease within 24 hours, then twice the radiation dose is added. They have treated 14 cases of adnexal disease, 4 febrile abortions, 2 menorrhagias resulting from uterine myomata, and 2 gestation hemorrhages. In 19 cases cessation of bleeding took place within 24 hours and in 3 cases an additional two-thirds E. S. D. was applied after 48 hours with a prompt cessation of the hemorrhages. They state that removal of the spleen causes hyperfunction of the ovaries, therefore

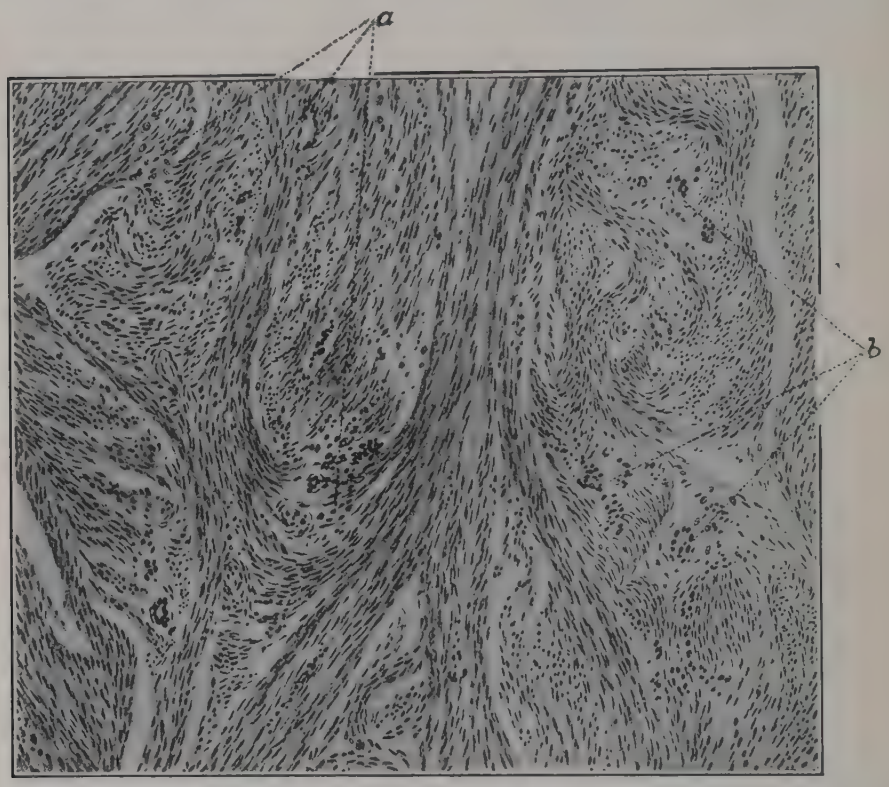


FIG. 166.—THE UTERUS WAS REMOVED TEN DAYS AFTER A COMBINED RADIUM AND X-RAY APPLICATION OF ABOUT 130 PER CENT E. S. D. Note the marked fibroblastic infiltration and almost complete disappearance of the carcinoma cells.

increased activity of the spleen attained with an irritating X-ray dose reduces ovarian function.

The employment of radiations in any form leads to constitutional reactions. They are a protein toxicosis and a disturbance of the system of endocrine glands. The split protein is derived from the destructive effect of the rays on the blood-corpuscles, the diseased cell, and the normal tissues. The temporary or permanent destruction of endocrine glands leads to serious disease.

The only endocrine gland in the pelvis is the ovary, and as we are familiar with the symptoms and disturbances of castration we shall not consider this complication of radiation therapy. It may suffice to state that the lethal

radiation doses applied to deeply seated carcinomata are destructive to endocrine glands as the adrenal glands, the spleen, and pancreas in the upper abdomen and the thyroid, parathyroid, pituitary, and secretory glands in the head and neck. Lesions in these regions require an entirely different radiation technic than gynecological diseases.

The severity of the protein toxicosis does not only depend upon the energy measured at a certain region in the deep of the body attained within a known time period but also on the size and number of the radiation beams. The larger the port of entry, the greater will be the amount of tissue exposed

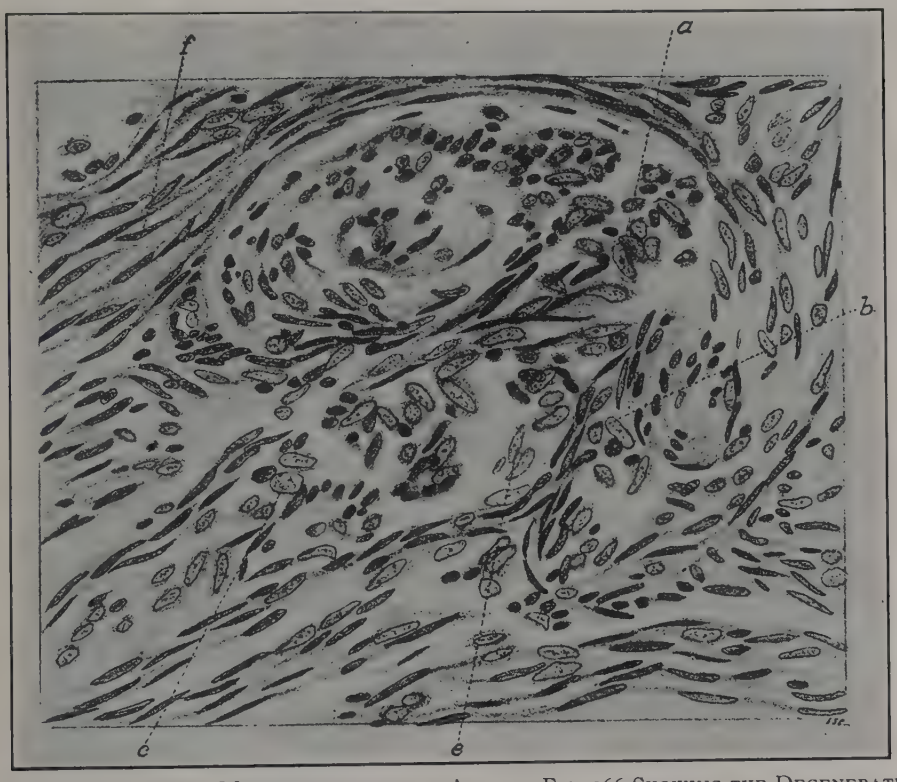


FIG. 167.—HIGH POWER MAGNIFICATION OF AN AREA OF FIG. 166 SHOWING THE DEGENERATION OF THE NUCLEI AND PROTOPLASM OF THE CANCER CELL.

to the rays, and the greater the number of beams, the greater must be the amount of tissue exposed to rays. The radiation beams form a pyramid. Observing a focus skin distance of 50 cm., then the pyramids of an altitude of 20 cm. have the following dimensions:

Apex	Base
9 cm. sq.	12.8 cm. sq.
12 " "	17 " "
15 " "	21 " "
20 " "	28 " "

Therefore the port of entrance should be as small as possible. As the true bony pelvis is 11 cm. wide at the inlet, and the distance from the promontory of the sacrum to the perineum measures from 15 to 20 cm., the points of entry should be 15 cm. wide transversely and 15 to 20 cm. wide longitudinally. Should the inguinal lymph-nodes be involved, then the beams must be correspondingly larger. It has been recommended to extend the points of entry upwards to include the inferior and superior lumbar lymph-nodes in the treatment. Involvement of the lumbar lymph-nodes means dissemination of the carcinoma to the upper abdominal region and general carcinomatosis. Radiation treatment in such a generalized primary pelvic cancer is

FIG. 168.—A SQUAMOUS EPITHELIAL CELL CANCER OF THE UTERINE CERVIX.

hopeless and should not be commended. Hence larger fields than 15 or 20 cm. square are not advisable.

The effective gamma intensity of 50 mg. radium element to destroy blood-corpuscles, if 4,800 mg. el. hrs. are applied, lies within the iosdose 5 which has a diameter of 13.5 cm. and for epithelial and endothelial tissue within the isodose 20 which forms an ellipse 6 cm. wide and 8 cm. long. Hence the protein toxicosis should not be so severe with gamma rays as it would be from a similar energy of X-rays.

Any measure which causes breakdown of body protein produces clinical results similar to the injection of proteins. The injection of proteins and of products of protein breakdown and of destruction of body cells all produce a similar reaction. Therefore it appears probable that the common active

principle is a product of protein decomposition. An excess of protein breakdown products is violently toxic and the symptoms and signs of protein toxicosis are correspondingly severe. They may be so severe as to cause death.

The symptoms of protein toxicosis resemble the symptoms of anaphylaxis. They are: a rise in temperature, an increase in pulse rate, prostration, a contraction of plain muscles, an increased secretion of glands, and an increased permeability of the capillaries, particularly of the liver capillaries.[25]

The signs are an immediate leukopenia, followed by a leukocytosis. During the latter stage an increased number of young and atypical red cells and an

FIG. 169.—THE UTERUS WAS REMOVED THREE MONTHS AFTER THE APPLICATION OF ABOUT 175 PER CENT E. S. D. OF RADIUM AND X-RAYS. Note the connective tissue formation and practically total absence of malignant cells.

increased number of platelets are seen. There is an increase in fibrinogen, globulin, thrombokinase, and blood sugar content. The non-protein nitrogen content is raised considerably. The proteolytic ferments and antibodies in the blood are increased.

Peterson [26] states that the detoxication lies in the ability of the cells or fluids of the invaded organism to digest the toxic protein fragments to the lowest degradation product, that is, to the non-toxic stage, and in this way overcome the deleterious effect. Abderhalden has shown that whenever a specific protein was introduced parenterally into the blood stream, specific enzymes were mobilized which digested the protein so injected. This reaction of the enzyme and the substrate was demonstrated by means of the dialysis reaction. The sources of the proteolytic enzymes are: (1) serum enzymes,

seemingly derived from disintegrating leukocytes; (2) the gastro-intestinal tract, the large abdominal organs and areas pathologically altered either by infection, trauma, burns or rays; they include tryptase and protease; (3) serum ereptase or protease. The latter is an enzyme able to digest partly hydrolyzed proteins to the amino-acid stage. The protein toxicosis is diphasic. The negative phase is characterized by the symptoms and signs above enumerated, and the positive phase by euphoria, lowering of the temperature, improvement of the circulation, and so forth. The latter is due to at least three factors; (*a*) the destruction of toxic material at the focus after the primary increase in digestive activity, (*b*) lessened susceptibility of the cells of the body to intoxication, and (*c*) actual protoplasmic stimulation.

The negative phase of the protein toxicosis is characterized by changes in the white blood corpuscles, that is, leukopenia and subsequent leukocytosis, and marked disturbances in the nitrogen metabolism with evidence of nitrogen destruction following the anaphylactic shock.

The changes in the blood are, therefore, brought about in two ways; (*a*) by the direct effect of the rays on the mononuclear lymphocytes and polynuclear neutrophiles in the defensive wall surrounding the carcinoma and in the blood and lymph stream; (*b*) by the indirect effect of breakdown of tumor and tissue cells.

Stevens,[27] Zumpe [28] and others have investigated this phase of the radiation reaction. They ascribe the changes in the white blood-corpuscles to the destructive action of the rays. The relative as well as absolute leukopenia reaches its lowest level within three days after the radiation, and disappears within from ten to fourteen days under favorable conditions. If the leukopenia should persist, the prognosis of radiation treatment is bad.

The intensity of the leukopenia after radiation depends: (1) on the number and the size of the blood-vessels within the radiation area; (2) on the abundance in this area of young blood cells, that is, hematopoietic organs; (3) on the degree of absorption of split proteins; and (4) on the radiation dose. Since 1 and 2 are always known, the number of leukocytes gives an estimate of the efficiency or inefficiency of the radiation dose. For instance if after the radiation of malignant tumors in a certain region and depth of the body we usually observe a decrease of from 3,000 to 4,000 in the number of leukocytes and leukopenia does not appear, we may expect a negative result from the treatment due to underdosage.

Wintz,[9] in a discussion of the systemic injuries from radiations, claims that an acute destruction of the blood-corpuscles occurs during each therapeutic irradiation for the destruction of malignant cells. The degree of the destruction of the blood-corpuscles depends on the quantity of rays introduced into the body of the patient. The quantity of rays depends on the size and number of the X-ray beams and not on the energy applied to the lesion. Wintz proposes a new factor "a" which is the quantity of X-rays generated at about 180 Kv. max. filtered with 0.5 mm. zinc and contained within a pyramidal stump, the upper surface of which is 6 by 8 cm., the altitude 15 cm., and the apex 23 cm. The latter point is located in the target of the X-ray tube. If doses of 2½ to 3 "a" are introduced into the body, the first

recognizable blood injuries will occur. These are speedily counteracted by the defensive forces of the body. Blood injuries caused by 5 to 7 "a" will be overcome within five to six weeks, provided the percentage of hemoglobin was 40 per cent or higher and the leukocyte count not less than 2,500. Uterine carcinomata receive 6 to 8 "a." This amount of rays does not result in irreparable blood injuries. Mammary carcinomata require as many as 12 "a." When such amounts of rays are introduced into the human body, a restoration of the blood to normal may be regularly observed.

We cannot entertain such optimism. The ability of the patient to endure and repair such blood injuries depends on the functional state of the blood-forming organs and the capacity for repair of the organism. An organism not weakened by tumor disease is much more able to resist the injuries caused by the rays and much more capable to respond to the sudden demands for reparative processes.

The chemical analysis of the blood was made before the beginning of radiation, immediately after the treatment, and again one week, four weeks, and eight weeks later in order to study the disturbance of the nitrogen metabolism. The examination comprised the determination of the non-protein nitrogen, the urea, the uric acid, the sugar, the creatinin, and the chlorids. The following table gives the collective results. The values for the normal and beginning pathologic conditions are taken from Myers.[29] We did not attempt to place the patients on a rigid diet, but had them continue their customary habits of ingestion of liquids and food. We are, however, conducting an additional number of investigations in which the patients receive a standard, predetermined diet.

Results of Chemical Changes in the Blood in Carcinoma and Irradiated Carcinoma

Condition	N. P. N., mg. to 100 c.c.	Urea N, mg. to 100 c.c.	Creatinin mg. to 100 c.c.	Uric acid, mg. to 100 c.c.	Sugar, per cent	NaCl, per cent
1. Normal	25–30	12–15	1–2	2–3	0.09–0.12	0.40–0.50
2. Beginning pathologic	35	20	3.5	4	0.15	0.52
3. Carcinoma	29.4	14.6	2.08	2.83	0.088	0.42
4. Immediately after radiation	35.0	17.8	2.26	3.17	0.113	0.42
5. Eight days later	29.7	15.7	2.13	2.83	0.096	0.416
6. Four weeks later	28.8	14.4	.....	2.6	0.085	0.47
7. Eight weeks later	24.8	12.3	2.2	2.72	0.074	0.45

The highest and lowest values obtained were:

Time	N. P. N., High	N. P. N., Low	Urea N, High	Urea N, Low	Creatinin, High	Creatinin, Low	Uric acid, High	Uric acid, Low	Sugar, High	Sugar, Low	NaCl, High	NaCl, Low
Before radiation	42.3	20	20.8	9.6	3.6	0.89	5	0.56	0.14	0.05	0.5	0.35
Immediately after radiation	68.4	24.4	25.4	11.9	4.2	1.1	5.1	0.81	0.14	0.06	0.45	0.38
Eight days later	44.0	22.0	26.2	11.	3.9	1.04	4.9	1.0	0.14	0.05	0.5	0.37
Four weeks later	35.8	....	....	12.	....	....	....	....	0.105	0.07	....	....
Eight weeks later	30.6	20.8	....	9.	3.1	1.5	....	....	0.13	0.07	0.5	0.39

These investigations demonstrate that all the nitrogen constituents of the blood are markedly increased; and the sugar percentage remains normal; and that the percentage of sodium chlorid is decreased in the majority of the cases examined. However, all these constituents of the blood return to normal within from one to two weeks. The concomitant changes in the behavior of the white blood counts and the differential white blood count also reach the peak with the cessation of the radiation treatment, which in our clinic is usually of four to five days' duration. After the lapse of another eight to ten days the blood count and the chemical blood changes have reverted to normal. Exceptions are furnished by patients who are poor risks, that is, have large tumors or indications of an advanced cachexia when the blood changes remain for a longer time or are permanent. The constitutional reaction may activate the organism to an increased effort in its fight against the malignant disease and thus reëstablish the avidity of the body against the cancer disease.[30]

THE TREATMENT OF THE "RADIATION SICKNESS"

Patients subjected to massive doses of radiations necessary in the treatment of cancer usually suffer from a complex of symptoms which has been designated by the French as "radiation indisposition," by the Germans "Roentgen and Radium Kater," and the English "radiation sickness." The symptoms are immediate nausea and vomiting, and after a few days a rise in temperature, increase in pulse rate, anorexia, diarrhea, and marked prostration. Within a week the symptoms usually subside. Frequently, however, we observe an extreme fatigue, persistent nausea and anorexia, diarrhea, vesical and rectal tenesmus. The persistence of anorexia and fatigue causes loss of weight and strength, and secondary anemia.

The nausea and vomiting, which appear during or immediately after the application of each séance of the X-ray treatment or of the radium application, must be ascribed to the direct influence of the rays and to extraneous circumstances, while the other symptoms are due to the protein toxicosis. A persistence of the latter indicates a persistence of the negative phase of the toxicosis. The vesical and rectal tenesmus and the frequent urinations and diarrheas must be ascribed to the estal effect of the rays on the bladder and rectal mucosa.

The symptom complexes may be profitably considered under three heads: (*a*) the "radiation sickness"; (*b*) the radiation toxicosis; and (*c*) the radiation cystitis, proctitis, and enteritis.

The symptoms of the radiation sickness are nausea and vomiting. They occur often toward the termination, and almost always immediately after a treatment. The causes have been variously interpreted: They may result from the inhalation of the electrically charged air and the surcharge of ozone in the treatment room. The nausea and vomiting have also been attributed to the irritation of the sympathetic nervous system by the rays. Lately it has been claimed that they are due to an immediate decrease in the sodium chlorid content of the blood. Again, others ascribe it to an acidosis, and others to an

alkalinosis. The prevention of the radiation indisposition requires a continuous change of fresh air in the treatment room by the installation of proper ventilation by means of ventilators. It has been advised to place the patient in a Faradic cage and thus to mimimize the effects of the electrical charges of air and patient.

The patient should be properly prepared by the administration of cathartics and enemata, and by the insertion of retention catheters into the urinary bladder to keep the bowels and bladder empty during the treatment. The abstinence from food for at least four hours prior to the treatment is also advisable. During the days of treatment the diet must be easily digestible and concentrated, consisting mainly of milk, gruels, jellies, and egg albumin. Acidosis indicates the administration of sodium bicarbonate in 2 gm. doses four times daily; alkalinosis requires any one of the commoner acids, as dilute hydrochloric acid, dilute nitro-hydrochloric acid, dilute aromatic sulphuric acid. Codein in 0.033 gm. doses given one-half hour before treatment often prevents the distressing symptoms of radiation sickness and also places the patient in a euphoria which ameliorates the ordeal of the long-continued treatment. In spite of the carefully applied pre-radiation treatment many of the patients will suffer from the radiation indisposition. The observation that the chloride percentage of the blood is rapidly lowered during the treatment induced Siehmann and Schlagintweit [31] to recommend the intravenous injection of 10 c.c. of normal saline solution immediately after the termination of each séance of the treatment. I have used the method of normal saline intravenous injections in many cases and have observed immediate subsidence of the nausea and vomiting.

The protein toxicosis should be treated symptomatically. Rest in bed, hydrotherapy for hyperpyrexia, stimulation, proper nourishment, and so forth, are useful. The toxicosis is usually self-limited, disappearing by lysis within a few days. Should the symptoms become progressively worse on account of the anaphylactic shock or a failure of the system to detoxicate the split proteins, I then resort to blood transfusions as the best means of promptly counteracting the severe toxemia.

Should the negative phase of the protein toxicosis persist and with it the leukopenia, I also recommend blood transfusions and the intravenous administration of colloidal metals. The intravenous injection of colloidal metals is followed by a chill, fever and leukocytosis, that is, a non-specific reaction. Whether the latter is due to the metal or to the protective colloid cannot as yet be answered. I have frequently observed that patients who had a persistent leukopenia and a refractory behavior as regards the local healing after radiation treatment, improve after the intravenous injection of colloidal metals. The blood count returns to normal and local healing ensues.

The radiation cystitis responds well to infusions of buchu, sodium bromid, lithium salts, tincture of hyoscyamus, tincture of belladonna, and so forth. The radiation proctitis and enteritis should be treated with starch enemas preceding and following each bowel movement, the rectal injection of 120 c.c. of olive oil to be retained during the night, the oral administration of 60 c.c. of mineral oil in 60 c.c. of cream at night on retiring, and a bland diet consist-

ing of milk, gruels, egg-albumin and carbohydrates, and free from meats, vegetables and fruits.

THE TREATMENT OF THE SKIN INJURIES

The application of rays may cause either immediate or latent injuries or changes in the skin exposed to radiation.

The *immediate injuries* of the skin are burns of the second and third degree. They may result from a hypersensitiveness of the skin to the rays, extraneous causes, and overdosage.

Skin exposed to radium and X-rays reacts in the same manner as it does to sun or light rays. A weak but long-continued action of the rays causes a tanning of the skin. The discoloration is usually accompanied by a slight scaling of the epidermis appearing about eight to ten days after the radiation. The tanning of the skin may persist for months and years. It is the more intense, the softer the rays are. A heavily filtered radiation is followed by a less intense tanning.

If the dose of rays applied is larger, that is, about 100 per cent E. S. D., then the skin will show within fourteen to twenty-one days an inflammatory reddening and an epilation. A more or less severe itching is noticed. The epidermis will shed in fine scales. Within six to eight weeks the erythema disappears but the skin is tanned deeply. The tan will peel off within nine to twelve months, leaving a white, normal skin behind. Most of the hair will also regenerate. The treatment for the erythema is Dodd's lotion. The formula is:

℞ Zinci oxidi 16.0
Glycerini 4.0
Phenolis 2.0
Aqu. calcis ..... q.s. ad. 175.0

M. et S.: Apply with cotton every morning and evening.

Should the same radiation dose be repeated within six to eight months, then the epilation may become permanent and a persistent edema and induration of the epidermis, the cutis, and the subcutaneous fat may appear. The induration may last from one to two years.

Should a still larger dose be applied, for instance, an estal skin dose of 130 to 150 per cent E. S. D., then a burn of the second degree will be caused. Vesicles appear with the erythema. The blistering is strongest in the center of the radiation field. The blisters break, leaving a superficial ulceration behind. The latter becomes covered with a crust. The healing is rather slow. However, in from two to three months it will be completed. The area is clear white, and telangiectasias will form within a short time. These changes are permanent.

If the radiation dose applied is about 200 per cent E. S. D., a burn of the third degree results. Necrosis, more or less deep, is seen, sloughing

occurs, and the tendency to heal is very minimal. Months will pass by. Often a secondary ulceration occurs within a year or two—the so-called X-ray or radium ulcer.

The treatment of the second and third degree primary burns consists in warm baths, the application of Dodd's lotion, zymol ointment, therapeutic light, exposure to open air, paraffin gauze dressing, and so forth. Digestive ferments applied locally may be of benefit.

The ulcerations frequently resist all treatment. Actinic rays,[32] excision with the electric cautery or surgical diathermy may then be employed. As soon as healthy granulations appear which show a tendency to persist and are not covered with a grayish pseudo-membrane, skin grafting or transplantation of skin flaps may be attempted.

Repeated applications of small doses of rays distributed over long periods of time are much more apt to cause severe intractable injury of the skin than one dose of highly filtered X-rays. Roentgen and radium cancer also will not occur after a single, even large, dose, though frequently repeated exposures often terminate in irreparable injuries.

Latent injuries of the skin are the result of too large or too frequently repeated applications of radium and X-rays. Such latent changes are an induration and swelling of the entire cuticle. The underlying fascia and muscles are frequently included in this process. The structures become boardlike. The skin is distinctly elevated over the level of the surrounding unaffected skin. Soon the tissues commence to break down in the center of the area; an ulceration appears which will slowly spread. Such changes in the skin are frequently seen in the deep folds of the nates and the anterior abdominal wall, especially if the skin is continuously moist or erythematous.

These changes cause a feeling of tenseness and a sensation of continued drawing; the patient frequently complains of a severe sensitiveness at the borders of the ulcer. The skin must be relieved of all pressure and all irritation. Ointments made of digestive ferments or zymol may be used. Actinic rays may be applied. Wintz states that such changes will evince a tendency to heal after a year or two if kept free from pressure and external irritation. We have excised such X-ray indurations if they involved only the skin, and covered the area with transplanted skin flaps. Figs. 170 and 171 show such a procedure. The patient was very obese and had a pendulous abdomen. One and one-half years after cessation of the treatment the patient complained of an excruciating sensitiveness within the area of ulceration. The ulcer resisted every known treatment. We resorted to a lipectomy. The changes were confined to the skin and subcutaneous fat. Healing occurred by first intention.

In another patient a second X-ray treatment of 130 per cent E. S. D. was inadvertently applied within four months after the first application. Three years later an indolent ulceration of a progressive character appeared which was refractory to all treatment. We finally excised the entire area, carrying the incision two centimeters distant from the induration. The fascia and muscles of the entire abdominal wall were also involved in the indurated process. We explored the pelvis at the same time. The pelvic organs were negative, the bowels did not show any changes. The transplanted skin flaps

FIG. 170.—X-RAY ULCER FROM ONE APPLICATION OF A 100 PER CENT SKIN DOSE, APPEARING 18 MONTHS AFTER CESSATION OF TREATMENT AND PRESUMABLY CAUSED BY THE CHANGES IN THE SKIN OF THE LOWER TRANSVERSE FOLD DUE TO A MARKED PENDULOUS ABDOMEN AND CONTINUOUS MOISTURE.

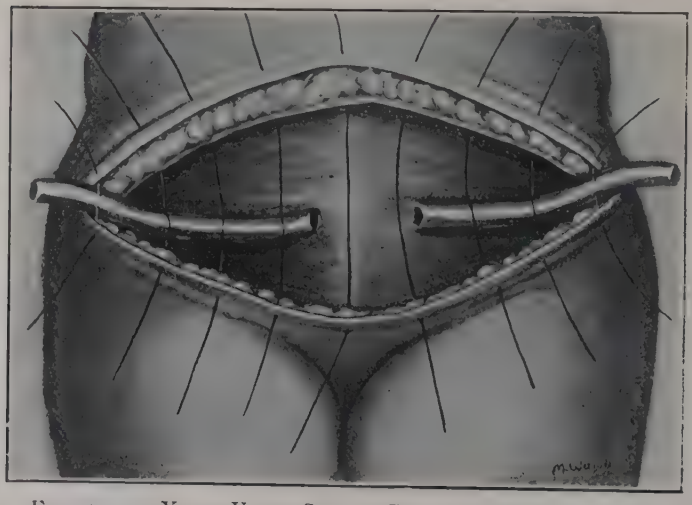


FIG. 171.—EXCISION OF X-RAY ULCER SEEN IN FIG. 170 WITH THE LIPECTOMY METHOD.

did not take. However, within six weeks the entire area was covered with healthy granulations which finally became covered with skin (see Figs. 172 and 173).

In conclusion we may state that if early or late skin injuries result from the application of rays, we should treat them expectantly and remove all sources of irritation, as pressure, irritating medicaments, and so forth. Should the involved skin area be freely movable over the underlying fascia and muscles

FIG. 172.—X-RAY ULCER AND INDURATION CAUSED BY THE RE-APPLICATION OF A 130 PER CENT SKIN DOSE WITHIN FOUR MONTHS AFTER THE FIRST APPLICATION. The ulcer appeared three years later.

and the ulceration and induration persist, then an excision with transplantation of skin flaps may be performed. If the underlying structures are involved, then watchful waiting appears to be the best method of treatment.

THE RADIATION TREATMENT OF DISEASES OF WOMEN

In the preceding paragraphs I have discussed every phase of the science of radiation therapy which comprises:

1. The determination of the intensities of X-rays and radium.

2. The determination of the biologic unit of the radiation dose which is the 100 per cent erythema skin dose.

3. The calculation of the combined radiation dose.

4. The actions of rays on the various cells, tissues, and organs by irritating inflammatory and lethal radiation doses.

5. The protein toxicosis and its clinical significance.

6. The treatment of accidental injuries of the skin and internal organs and the protein toxicosis.

A correct technic of radiation therapy must be based on the above factors.

The Preparation of the Patient.—The patient must be properly prepared for the treatment. The preparation should include a urine analysis, a

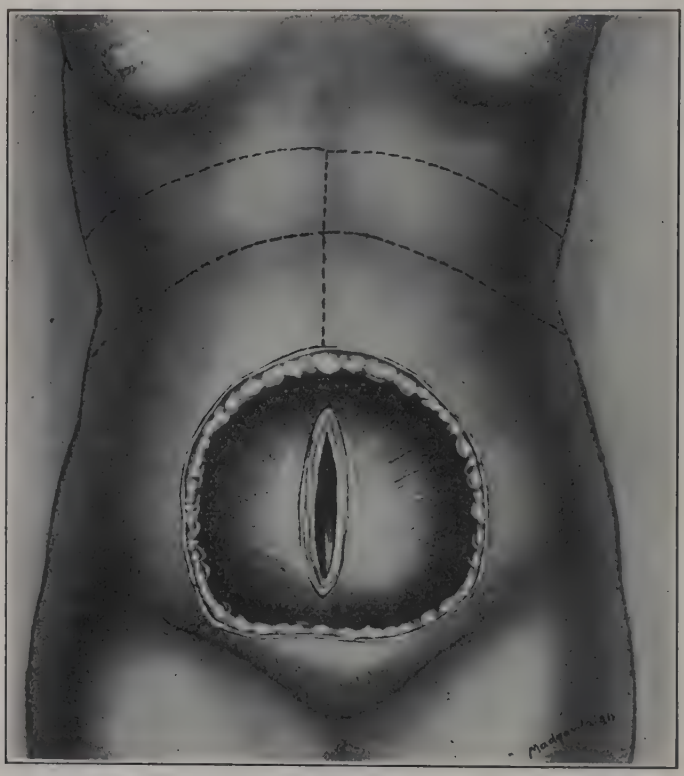


FIG. 173.—EXCISION OF THE ULCER AREA SEEN IN FIG. 172. The dotted lines indicate the skin flaps with which the ulcer area was covered.

complete blood examination including a differential white count, a cathartic and enemata to clean the bowels, a concentrated liquid diet which will not form large scybala in the intestinal tract. The bladder and bowels must be kept empty during the treatment. This is accomplished by enemata given before each séance, and the insertion of retention catheters in the bladder. Immediately after the completion of each séance the patient receives intravenously 10 c.c. of a freshly prepared normal saline solution. Two gm. doses of sodium bicarbonate in a glass of water are given every four hours alternately with orangeade or lemonade. At the cessation of the entire course of treatment I order either the elixir of iron, quinin and strychnin in 4 c.c. doses, three times daily after meals, or a capsule of Blaud's mass with arsenious acid

and cascarin. Should the nausea and diarrhea continue, we give a diet free of vegetable starches and meats, and order egg albumin water, milk, brown flour soup, and large doses of bismuth subnitrate or bismuth subgallate combined with resorcin. Rectal tenesmus is alleviated with normal saline or starch water enemata and suppositories of bismuth subnitrate to which may be added powdered extract of opium. For frequent and painful urination we give infusion of buchu, tincture of belladonna, tincture of hyoscyamus, sodium bromid, lithium citrate or lithium benzoate. Should the patient react violently and go into shock, which may occur, then hypodermoclysis with normal saline solution or transfusions of whole blood may become necessary. The reaction of the patient to radiation therapy requires as careful attention as postoperative treatment. Hence such patients should be hospitalized.

Carcinomata.—Carcinomata have received a great deal of attention on account of the frequent occurrence and the unfavorable character of their course.

Carcinoma may primarily involve every region and organ comprising the female genital tract. In treating cancer disease we must determine by minute physical and endoscopic examinations the extent of the cancerous growth, the involvement of the regional lymph-nodes, adjacent tissues and organs, the general state of health, and so forth. We must endeavor to answer impartially the following questions:

1. Is the carcinoma confined to the organ of primary involvement?
2. Has it invaded contiguous tissues and organs?
3. Has it invaded the regional lymph-nodes?
4. Has it caused metastases in distant parts or organs?
5. Is it complicated with other constitutional diseases?
6. Has an advanced cachexia been caused by the disease?

The answer to these questions enables us to determine:

(*a*) Whether the carcinoma is localized.

(*b*) Whether doubt exists after a physical examination of the localization of the carcinoma—the borderline case.

(*c*) Whether the carcinoma has already involved adjacent tissues or organs, or whether constitutional coexisting diseases render the patient a poor surgical risk—the inoperable case.

(*d*) Whether extensive involvement and advanced cachexia exist, rendering the case terminal and hopeless.

Based on these questions we may group the cases under two groups:

Group A—primary carcinomata; Group B—recurrent carcinomata. And in each group we have the following subgroups:

1. Localized.
2. Doubtfully localized.
3. Invasion of adjacent tissues or regional lymph-nodes.
4. Intense involvement as a "frozen pelvis" or advanced cachexia.
5. Complicating diseases which may render a case inoperable.

The indications for treatment are based on such a grouping. They are:

Groups *A*1 and *B*1—surgical eradication.

Groups *A*2 and 3, and *B*2 and 3—radiation therapy.

Groups *A*4 and *B*4—symptomatic treatment.

Groups *A*5 and *B*5—radiation if 1, 2 or 3 are present.

The object of the treatment of carcinoma by radiations is to cause a degeneration or destruction of the malignant cells without causing irreparable injury to normal tissues and organs. The application of the rays must include the diseased organ and the regional lymph-nodes. The radiation dose should be based on the microscopic findings of excised tissues from the tumor. Biopsy has been justly condemned by a number of our best surgeons who state that they have never seen a patient recover permanently when biopsy had been performed. The immediate application of radium or the actual cautery will, however, seal the avenues of escape of carcinoma cells into the circulation.

Carcinoma of the vulva is best treated with radium needles. When "needling" a carcinoma we must first encircle the entire growth with the needles. This row of needles must be placed into the healthy tissue surrounding the tumor and always in the direction of its center. The second row of needles is placed internally to the first row at a distance of 1 cm. and in the direction of the center of the growth, and so on.

The regional lymph-nodes of the vulva are the inguinal glands. Whether they are, or are not, palpable does not matter. They must be treated with the X-rays. Since they are rather superficially located it suffices to use an X-ray produced with 140 Kv. max., a 0.5 mm. copper filter, and a focus skin distance of 50 cm. anteriorly; while posteriorly an X-ray obtained with 200 Kv. max., 1.0 mm. copper filter, and 50 cm. focus skin distance must be used. The time duration of the application of the radium needles is eight hours if the cancer is basal-celled; ten hours if cylindrical-celled; and fourteen hours if squamous-celled—provided the needles are placed at a distance of 1 cm. from each other. The X-ray dose must also correspond to this dosage, that is, 100 per cent E. S. D. at the region of the glands in the basal-cell carcinoma; 130 per cent in cylindrical-celled-carcinoma; and 175 per cent in the squamous-celled carcinoma. The 175 per cent E. S. D., however, cannot be attained without serious injury to the skin. Therefore we must in addition insert needles containing radium in this region.

Carcinomata of the urethra are best treated by the insertion of radium capsules into the urethra and the needling of the paraurethral tissues. The regional lymph-nodes are the inguinal.

Carcinomata of the vagina should be treated with needles if they involve the lower anterior, posterior or lateral vaginal walls. Should the involvement of the vagina be rather general, radium capsules should preferably be employed. We must then use distance application to distribute a practically homogeneous intensity to the vaginal mucosa, the paravaginal tissues, and the rectovaginal and vesicovaginal septa. In carcinomata of the vulva and lower vagina we depend on radium solely for its local effect, and on the X-rays for the regional lymph-nodes. In carcinomata of the upper vagina we employ a combined radium and X-ray dose. Therefore we must make measurements and draw a medium section. We determine (1) the anterior-posterior diameter and the outline of vulva and buttocks; and (2) the depth and direc-

tion of the vagina. We then calculate the combined dose as previously described. The regional lymph-nodes of the upper vagina are the hypogastric and external iliac lymph-glands. The combined dosage depends on the microscopic findings. Distance radiation in vaginal carcinomata is performed by placing the radium in a phantom made of bakelite or pure pararubber. Its size must correspond to the isodoses 60 or 40. The greater the diameter of the phantom is, the longer the time duration of the application may be, and

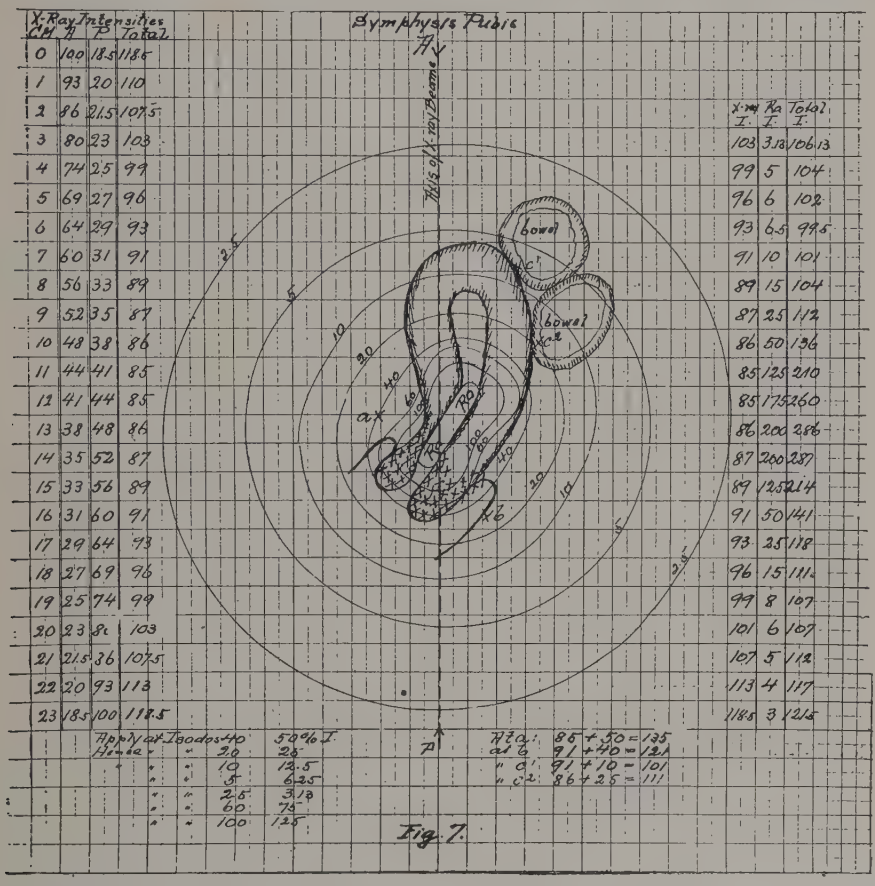


FIG. 174.—THE CALCULATION OF THE COMBINED X-RAY AND RADIUM DOSE IN A UTERINE CARCINOMA. The anterior posterior diameter is 23 cm. The cervix is 16 cm. beneath the anterior abdominal wall. The uterus is in anteversion. Points *a* and *b* denote the posterior vesical and anterior rectal mucosæ respectively.

the more homogeneous the radium dose in the vaginal mucosa and paravaginal tissue will be. Of course, it is absolutely necessary to keep bladder and rectum empty during the process of radiation.

The radiation treatment of *cervical and corporeal carcinomata* has been discussed in the chapter on the determination of the dose on page 364. Figs. 174 and 175 show the practical application of the technic.

The treatment of *ovarian carcinomata* requires an entirely different technic. The patient cannot safely endure the degeneration of large tumor

masses by the rays. Ovarian carcinomata are frequently accompanied by ascites. We cannot determine by a physical examination whether an ovarian carcinoma is operable or not. We, therefore, advise an exploratory laparotomy. The tumors are removed if it is possible to do so. We necessarily must determine involvement of the lymph-nodes, the peritoneum, and the bowels. An involvement of these structures does not constitute a contra-indication to the bilateral oöphorectomy. If the ovarian carcinoma is localized,

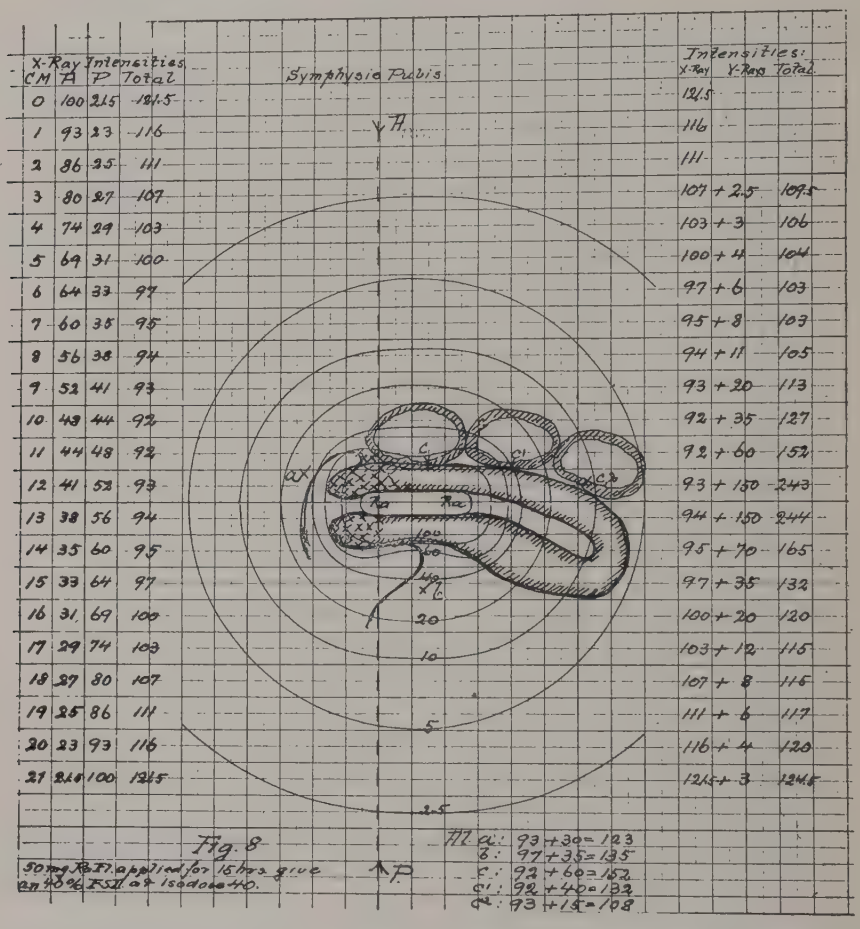


FIG. 175.—THE CALCULATION OF THE COMBINED RADIUM AND X-RAY DOSE IN A UTERINE CARCINOMA. The uterus is in retroversion. Points c, c^1 and c^2 indicate the position of the small bowel, a the posterior bladder mucosa, and b the anterior rectal wall.

we perform a panhysterectomy, as radiation treatment is not indicated. Otherwise a bilateral salpingo-oöphorectomy only is done. The uterus is left behind because it forms the best filter located in any region of the body. As soon as the patient is convalescing, we carry out the radiation treatment according to the method employed in uterine carcinomata. It frequently happens that the ascites reforms rapidly. We then resort to a McDill lymphangioplasty.[33] The following cases illustrate the method of the treatment:

Mrs. M. G., Case No. 1339: Age, forty-two; W., O-para. Admitted Oct. 6, 1921. Patient observed a rapidly increasing enlargement of the abdomen since July, 1921. An abdominal section was performed Aug. 24, 1921. Considerable hemorrhagic ascites was found. The ovaries were enlarged and firmly adherent to surrounding tissue. Many small nodules were scattered through the peritoneum, even in the peritoneum of the liver. A removal of the tumors was not deemed advisable. X-ray examination before operation did not show bony or pulmonary metastases. The microscopic examination was adenocarcinoma of ovaries. Oct. 6, 1921, 100 mg. radium element were inserted intra-uterine for 30 hours. Oct. 7, 10 and 11, three fields of 20 cm. square suprapubically, sacral and upper abdomen were exposed to a full erythema skin dose. The factors were 140 K.v. max., 0.5 mm. copper plus 1.0 mm. aluminum plus 6 mm. soleleather filters; 65 cm. F. S. D. 5 ma., time duration 210 minutes to each field. The combined radiation energy is therefore 130 per cent E. S. D. at the center of the pelvis. On Nov. 21, the abdomen was again distended with fluid and a lymphangioplasty was made. The ascitic fluid became entirely absorbed within six weeks. The tumors steadily decreased in size. Sept. 27, 1922, patient had gained 50 pounds in weight and felt perfectly well. The uterus was found freely movable, the left ovary size of a man's fist, the right ovary apparently of normal size. At the present writing the patient appears to be in perfect health.

Mrs. J. Z., Case No. 1413: Age, twenty-nine; married, 6-para. Admitted to hospital, Jan. 16, 1922. The patient complained of pain in the left pelvic region of two months' duration. The pain was intermittent and dull, and intensified during the menses. It was gradually increasing in severity. Examination revealed the pelvis filled with a hard and fixed mass irregular in outline, probably an ovarian growth. A laparotomy was performed the next day. The tumor mass involved the uterus, adnexa, adjoining peritoneum, and pelvic organs. Enucleation of the mass was considered impossible. A portion of the tumor was excised for microscopic diagnosis, which revealed an ovarian adenocarcinoma. From Jan. 24 to 30, X-rays were applied through four ports of entry. The factors were: 140 K.v. max., 0.5 mm. copper plus 1 mm. aluminum plus 6 mm. soleleather filter, 65 cm. F. S. D., 5 ma., time duration 210 minutes to each field. After an apparent local improvement the patient returned for examination on Aug. 15, 1922, evincing an advanced cachexia. She now entered the County Hospital, being assigned to my service. On Aug. 21, 1922, a laparotomy was performed and the entire tumor mass with the uterus was removed. She then received from Oct. 4 to 8, 1922, another course of X-rays of 200 K.v. max. through four fields of entry; 100 per cent E. S. D. to each field. The patient rapidly regained weight and strength and has retained complete enjoyment of life and working capacity to date. Pelvic examination now reveals a heavy scar tissue throughout the pelvis which does not cause any inconvenience to the patient.

The treatment of *sarcomata* is carried out along the same lines, namely, detailed physical examination, histological diagnosis and careful determination of the radiation dose based on microscopic examination.

Chorion epithelioma malignum is treated the same as a uterine carcinoma. The lethal radiation dose is 130 per cent E. S. D.

Benign Hemorrhages of the Uterus.—Benign hemorrhages of the uterus amenable to radiation treatment result from: (1) essential menorrhagia or hemorrhagic metropathy; (2) myomata uteri; and (3) inflammatory adnexal disease.

In the treatment of these bleedings it becomes an imperative necessity to rule out malignant disease. This can be accomplished only by a careful diagnostic curettage of the endometrium and a diagnostic excision of tissue of the cervix if the latter evinces abnormal tissue changes. Microscopic examination of such removed tissues will enable us to exclude malignant disease. In the diagnosis of hemorrhagic metropathy we must exclude disturbances of the system of the endocrine glands. Hypothyroidism and hypopituitarism often cause menorrhagia.

The radiation treatment of hemorrhagic myopathies consists in the application of the gamma ray or the X-ray therapy. The technic and dosage varies with the age of the patient. In hemorrhages of the adolescent women and of women in middle life desiring offspring we must attempt to reduce the bleeding by the application of an inflammatory ovarian dose. If we use radium, then a dose of 300 mg. el. hrs. is sufficient. Should the dose not bring about a normal menstrual flow, then we may repeat the application after an interval of six months. The inflammatory ovarian dose of X-rays is 25 per cent E. S. D. applied to the ovaries. The ovaries are from 6 to 7 cm. beneath a plane drawn through the anterior superior spinous processes of the innominate bones. Hence, using 140 Kv. max., a filter of 0.5 mm. copper, a focus skin distance of 50 cm. and 5 ma., the time duration of application would be one hour through one anterior field.

In women thirty-five years or older the gamma rays dose must be 600 to 1,200 mg. el. hrs. to cause fibrous degeneration of the entire endometrium. The X-ray dose to cause cessation of ovulation and destruction of the primordial follicles is 50 per cent E. S. D. Hence the application of the X-ray with the same factors would take two hours.

Hemorrhages occurring in women who have passed the menopause must be treated like carcinomata, that is, with a combined X-ray and gamma ray treatment. I insist on this even in the absence of microscopic evidence. I have twice seen such patients return with a recurrence of the uterine hemorrhages, and examination at this time evinced carcinoma. Stacy [32] also made this observation in 2 out of 1013 cases of benign uterine hemorrhages treated with a castration dose.

In treating benign hemorrhages of the uterus the radium capsule must be placed against the fundus. If placed accidentally near the internal os, destruction of the mucous membrane lining the internal os may occur. The result would be an atresia with a subsequent pyometra, hydrometra, or hematometra, necessitating a hysterectomy for relief.

The indication for radiation treatment of uterine myomata is uterine bleeding—usually menorrhagia. Myomata causing pressure symptoms, undergoing degenerations, complicated by adnexal disease, or of submucous, subserous

or cervical location should not be treated. Likewise, myomata larger than a four months' pregnancy should not be subjected to radiation treatment unless constitutional contra-indications to hysterectomy exist. Women of the child-bearing period desiring offspring should be myomectomized.

The object of the ray treatment is the arrest of menorrhagia. The myoma will decrease in size or disappear simultaneously with the progress of senile atrophy in about one third of the cases. We should not attempt to bring about a decrease of the myoma by radiation as this is an impossible task. In other words, the only symptom of myomata uteri amenable to radiation therapy is hemorrhage.

Adenomyomata, especially the diffuse growths, should be removed surgically if this is possible. A great number of these tumors cannot be removed on account of invasion of neighboring tissues and organs. In such cases, we must treat them with radiations, using the same technic as recommended for uterine carcinomata.

Myomata of the vagina and vulva are always excised.

Metrorrhagias and menorrhagias are often found following salpingo-oöpherectomies for infectious disease. Should a curettage or proper medical treatment not terminate in a permanent relief of the bleeding, then irritating doses of X-rays to the spleen or inflammatory doses to the pelvic organs will cause a cessation of the bleeding. Radium also may be inserted into the uterine cavity as recommended for essential menorrhagias. The choice of treatment is the radiation of the spleen as it maintains ovarian function.

Chronic cervicitis may be treated with gamma rays. I use a special applicator (see Fig. 176). A 25 milligram capsule is inserted in the tube and

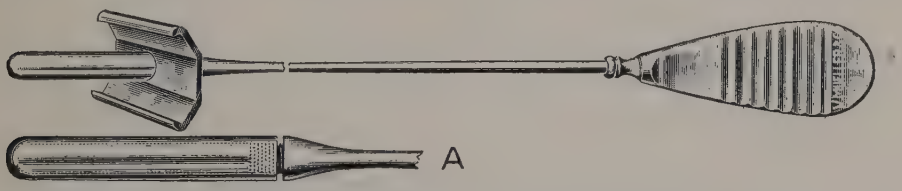


Fig. 176.—Instrument for the Application of Radium to the Vaginal Portion of the Cervix and the Cervical Canal (v. Mueller & Co.).

six ten milligram radium needles are put in two triple filters on the cap. The carrier is then placed into the cervical canal and against the cervix. The time duration of the application is four hours. The vagina must be firmly packed with gauze sponges to prevent the walls coming in contact with the radium carrier. However, the actual cautery with the electric cautery knife gives as good results and is, therefore, the method of choice in our clinic.

Tuberculosis of the Genital Organs.—Tuberculous infections of the female genital tract are usually secondary, the primary focus being in the gastro-intestinal tract or the lungs. It is, of course, useless to treat the secondary infection unless the primary focus has healed. Sexual activity and the monthly changes in the genital organs resulting from the menstrual cycle are prone to keep the infection active. Tuberculous changes of a cheesy character should not be treated with radiations. They must be drained. As soon

as the cheesy material has been removed the final healing of the fistulous tracts may be hastened by radiation therapy. The X-ray is the remedy of choice. The object of the treatment is stimulation of the reparative processes. Destruction of tissues must be avoided. Stimulation of the tuberculous focus often causes an acute exacerbation. This may be avoided by subjecting the patient to the Rollier method of actinic ray treatment.[35] As soon as this has been completed the X-ray can be safely applied. It consists in a homogeneous radiation of a 50 per cent E. S. D. We should use the lower voltage of 140 K.v. max., a 0.5 mm. copper filter, and a focus skin distance of 50 cm. The absorption curve of these X-rays is given in Fig. 146. Using two fields, and measuring the antero-posterior diameter we can then determine the combined intensities and determine therefrom the time duration of application to attain a 50 per cent E. S. D. at the depth of the cervix.

The general hygienic and medical management of tuberculous disease must not be omitted, but should be faithfully carried out. The actinic ray treatment is continued at biweekly intervals. The X-ray treatment should not be repeated before the end of three months, if a second application is indicated at all.

Pruritus Vulvae.—Pruritus of the vulva, chronic eczema and erythema that are purely primary and local, are greatly relieved by the application of X-rays. The patient is placed in a lithotomy position and the hips are raised so the X-ray tube can be centered over the vulva. Unfiltered rays of 85 K.v. max. focus skin distance of 35 cm. and 2 ma. suffice as we desire a superficial action only. The time duration of the application is 5 minutes.

Leukoplakia of the vulva is always accompanied by pruritus. The latter is often temporarily relieved by X-ray applications.

Ovarian Disfunction.—Amenorrhea, oligomenorrhea, and sterility may result from delayed development or ovarian dysfunction. A stimulation of the ovaries is indicated. There is no other remedy at our command which will bring about a stimulation or an increased ovarian activity safer and better than the X-ray. A 10 per cent E. S. D. applied to the ovaries is the irritating ovarian dose. It may be repeated every two or three months until the desired effect is attained. Other hygienic measures of treatment, such as regular habits of sleep, out-of-door life, physical exercises, tonics, and wholesome diet must not be neglected.

The deductions presented in the foregoing pages have been based on studies and observations covering a period of more than twelve years; yet, it may be that the progress of the science of radiology may lead to many changes in time to come.

The discussion of the physics and the determination of the radiation dose has been highly technical—perhaps, too much so in a book destined, primarily, for the needs of general practice. The practical application of radiation, however, presupposes a thorough knowledge of the intricate scientific and technical factors pertaining to the subject. The mere possession of an X-ray apparatus or a certain amount of radium does not enable the owner to employ the radiation treatment with all the benefits that may be derived from this form of therapy.

The crude, and often harmful, empiricism of former days has given way to an exact science. It follows that radiation treatment can be safe and successful only in the hands of the expert. Applied to our special field, it means that the expert must combine a knowledge of both radiology and gynecology. The close coöperation of the practitioner and the specialist will result in early diagnosis and proper treatment, and secure for the patient the prospect of complete recovery.

LITERATURE

1. Keetmann and Mayer. Gesichtspunkte für die Mesothoriumtherapie. Strahlentherapie, 1913, 3: 743.
2. Keetmann and Mayer. Zur Messung von Thorium X-Präparaten. Strahlentherapie, 1913, 2: 243.
3. Compton. Physical Review, 1921, 18: 96.
4. Crowther. Philosophical Magazine, 1921, No. 42, 719.
5. Friedrich and Kroenig. The Physical and Biological Principles of Radiation Therapy. English edition by Henry Schmitz, Rebman Co., New York, 1922, 88.
6. Friedrich and Glasser. Ueber die Dosenverhältnisse bei inkorporaler Radium und Mesothoriumtherapie. Strahlentherapie, 1920, 11: 20.
7. Barkla and Sadler. Philosophical Magazine, 1908.
8. Friedrich and Bender. Experimentelle Beiträge zur Frage der Sekundärstrahlentherapie. Strahlentherapie, 1920, 11 · 1.
9. Wintz. Injuries from Roentgenrays in Deep Therapy. American Journal of Roentgenology, 1923, 10, No. 2, 14.
10. Dessauer. Zur Therapie des Karzinoms mit Röntgenstrahlen. Dresden and Leipsic. Theo. Steinkopf, 1922, 7.
11. Szilard. Ueber einen Messapparat für Radioaktivität mit direkter Ablesung. Strahlentherapie, 1915, 4: 728.
12. Friedrich. Ueber einen Messapparat für Radioaktivität mit direkter Ablesung. Strahlentherapie, 1915, 4: 13.
13. Schmitz and Huth. The Determination of Equal Intensity Curves of Short Radium Capsules. Rebman Co., New York, 1922, 255.
14. Friedrich and Kroenig. The Determination of Equal Intensity Curves of Short Radium Capsules. Rebman Co., New York, 1922, 197.
15. Hoehne and Linzenmeier. Untersuchungen über die Lage der Ovarien an der Lebenden mit Rücksicht auf die Röntgenbestrahlung. Strahlentherapie, 1912, 1: 141.
16. Opitz. Zum Problem der Dosierung von Röntgen und Radiumstrahlen. Klin. Wchnschr., 1923, 2, No. 6.
17. Colwell and Russ. Radium and X-ray and the Living Cell. London, 1915.
18. Kroenig and Friedrich. The Physical and Biological Principles of Radiation Therapy. Rebman Co., New York, 1922.
19. Glocker, Rothacker and Schoenleber. Neue Methoden zur Messung der Tiefendosis im Wasserphantom. Strahlentherapie, 1922, 14: 389.
20. Schottländer and Kermauner. Zur Kenntnis des Uterus-Karzinoms. S. Karger, Berlin, 1912.
21. Dominici. Die Rezeptivität der normalen und pathologischen Gewebe für die Radiumbestrahlung. Strahlentherapie, 1914, 3: 379.

22. Wood and Prime. The Action of Radium on Transplanted Tumors of Animals. Annals of Surgery, Philadelphia, 1915, 751.
22. Prime. Observations upon the Effects of Radium on Tissue Growth in Vitro. Journal of Cancer Research, April, 1917, 2: 107.
23. Peterson and Saelhof. Organ Stimulation by the Roentgen Ray. Amer. Med. Journ., 1921, 76, No. 2, 718.
24. Wolmerhäuser and Eufinger. Die Milzbestrahlung bei Genitalblutungen. Münch. Med. Wchnschr., July 21, 1922, 69, No. 29, 1077.
25. Clark. The Scientific Bases for Non-specific Protein Therapy. British Med. Journ., 1923, No. 3243, 315.
26. Peterson. Protein Therapy and Non-specific Resistance. The Macmillan Co., New York, 1922.
27. Stevens. The Blood in Cancer under Roentgeno-therapy. Am. Jour. Roentgenol., 1917, 4: 215.
28. Zumpe. Die Veränderung des Blutbildes und ihre prognostische Bewertung in der Strahlentherapie des Karzinoms. Strahlentherapie, 1921, 12: 696.
29. Myers. Practical Chemical Analysis of Blood. 1921.
30. Kreuter. Ueber die Behandlung der bösartigen Geschwüre. Münch. med. Wchnschr., 1923, 70, No. 15, 451.
31. Sielmann and Schlagintweit. Wien. klin. Wchnschr., 1922, 35, No. 42, 1921.
32. Hazen. The Ultraviolet Ray in the Treatment of Roentgen Ray Telangiectasis. Am. Journ. of Roentgenol., 1922, 9, No. 2, 101.
33. McDill. Treatment and Drainage by Lymphangioplasty through a Trocar Wound under Local Anesthesia. Surg., Gynec. and Obst., 1913, 17: 523.
34. Stacy. The Treatment of Benign Conditions of the Pelvis with Radium. Am. Journ. of Roentgenol., Oct., 1922, 9, No. 19.
35. Pacini. Outline of Ultra-violet Therapy. Chicago, 1923, 80.

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